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Pyridopyrimidones, quinolines and fused N-heterocycles as bradykinin antagonists

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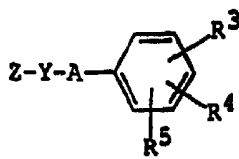
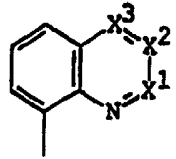
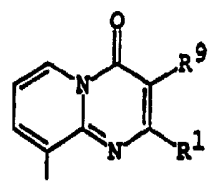
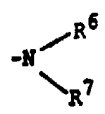
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(21) International Application Number: PCT/JP95/02192 (22) International Filing Date: 25 October 1995 (25.10.95) (30) Priority Data: 9421684.3 27 October 1994 (27.10.94) GB 9512339.4 16 June 1995 (16.06.95) GB (71) Applicant (for all designated States except US): FUJISAWA PHARMACEUTICAL CO., LTD. [JP/JP]; 4-7, Doshomachi 3-chome, Chuo-ku, Osaka-shi, Osaka 541 (JP). (72) Inventors; and (75) Inventors/Applicants (for US only): OKU, Teruo [JP/JP]; 8-2, Midorigaoka, Tsukuba-shi, Ibaraki 305 (JP). KAYAKIRI, Hiroshi [JP/JP]; 2-31-15, Umezono, Tsukuba-shi, Ibaraki 305 (JP). SATOH, Shigeki [JP/JP]; 3-25-4-304, Matsushiro, Tsukuba-shi, Ibaraki 305 (JP). ABE, Yoshito [JP/JP]; 9-9, Sakuragaoka, Kukizaki-cho, Inashiki-gun, Ibaraki 300-12 (JP). SAWADA, Yuki [JP/JP]; 1-602-208, Azuma, Tsukuba-shi, Ibaraki 305 (JP). INOUE, Takayuki [JP/JP]; 2-11-18-202, Takezono, Tsukuba-shi, Ibaraki 305 (JP). TANAKA,	Hirokazu [JP/JP]; 3-10-21, Hanayashiki Souen, Takarazuka-shi, Hyogo 665 (JP). (74) Agent: SEKI, Hideo; Fujisawa Pharmaceutical Co., Ltd., Osaka Factory, 1-6, Kashima 2-chome, Yodogawa-ku, Osaka-shi, Osaka 532 (JP). (81) Designated States: AU, CA, CN, HU, JP, KR, MX, RU, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.	
(54) Title: PYRIDOPYRIMIDONES, QUINOLINES AND FUSED N-HERETOCYCLES AS BRADYKININ ANTAGONISTS		
 (I)	 (a)	
 (b)	 (c)	
(57) Abstract The invention relates to Pyridopyrimidones, Quinolines and fused N-heterocyclic compounds of formula (I) wherein Z is a group of the formula (a) or (b) in which X¹ is N or C-R¹, X² is N or C-R², X³ is N or C-R², R¹ is lower alkyl, R² is hydrogen, lower alkyl, etc., R⁹ is hydrogen or lower alkyl, R³ is halogen, etc., R⁴ is halogen, etc., R⁵ is a group of formula (c), etc., A is lower alkylene, and Y is O, etc., and pharmaceutically acceptable salts thereof, to processes for preparation thereof, to a pharmaceutical composition comprising the same, and to methods of using the same therapeutically in the prevention and/or the treatment of bradykinin or its analogues mediated diseases in human being or animals.		

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DESCRIPTION

PYRIDOPYRIMIDONES, QUINOLINES AND FUSED N-HETEROCYCLES AS BRADYKININ ANTAGONISTS

5 Technical Field

This invention relates to new heterocyclic compounds and pharmaceutically acceptable salts thereof.

10 More particularly, it relates to new heterocyclic compounds and pharmaceutically acceptable salts thereof which have activities as bradykinin antagonists, to processes for preparation thereof, to a pharmaceutical composition comprising the same, and to methods of using the same therapeutically in the prevention and/or the treatment of
15 bradykinin or its analogues mediated diseases such as allergy, inflammation, autoimmune disease, shock, pain, or the like, in human being or animals.

One object of this invention is to provide new and useful heterocyclic compounds and pharmaceutically acceptable
20 salts thereof which possess activities as bradykinin antagonists.

Another object of this invention is to provide processes for the preparation of said compounds and salts thereof.

A further object of this invention is to provide a
25 pharmaceutical composition comprising, as an active ingredient, said heterocyclic compounds and pharmaceutically acceptable salts thereof.

Still further object of this invention is to provide a
30 therapeutical method for the prevention and/or the treatment of bradykinin or its analogues mediated diseases such as allergy, inflammation, autoimmune disease, shock, pain, or the like, using said heterocyclic compounds and pharmaceutically acceptable salts thereof.

35 Background Art

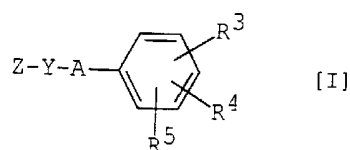
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Some heterocyclic compounds have been known as described, for example, in EP-A-224,086, EP-A-261,539, Chemical Abstracts 90:34849g (1979), or Chemical Abstracts 97:18948c (1982). However, it is not known that said compounds have activities as bradykinin antagonists.

Heterocyclic compounds having activities as bradykinin antagonists have been known as described in EP-A-596,406 and EP-A-622,361.

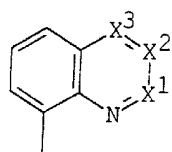
Disclosure of the Invention

The object heterocyclic compounds of this invention are new and can be represented by the following general formula [I] :

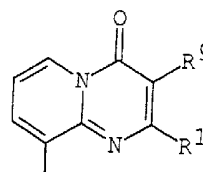


wherein

Z is a group of the formula :



or



in which X^1 is N or C-R¹,

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X² is N or C-R⁹,X³ is N or C-R²,R¹ is lower alkyl,R² is hydrogen; lower alkyl; halogen; aryl;

5 hydroxy(lower)alkyl; lower alkoxy(lower)alkyl;
 carboxy; esterified carboxy; carbamoyl
 optionally substituted with lower alkyl;
 cyclo(lower)alkoxy; lower alkoxy optionally
 10 substituted with a substituent selected from
 the group consisting of lower alkoxy, lower
 alkylamino, hydroxy, carboxy, esterified
 carboxy and carbamoyl optionally substituted
 with lower alkyl; halo(lower)alkoxy; lower
 15 alkylamino optionally substituted with a
 substituent selected from the group consisting
 of lower alkoxy, lower alkylamino and
 esterified carboxy; lower alkenylamino; or
 an N-containing heterocyclic-N-yl group
 optionally substituted with lower alkyl,

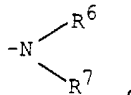
20 R⁹ is hydrogen or lower alkyl,

R³ is hydrogen, lower alkyl, lower alkoxy or
 halogen,

R⁴ is lower alkyl, lower alkoxy or halogen,

25 R⁵ is hydroxy; nitro; lower alkoxy optionally
 substituted with a substituent selected from the group
 consisting of amino, acylamino and lower alkoxy;
 piperazinyl substituted with acyl(lower)alkyl and oxo;
 or a group of the formula :

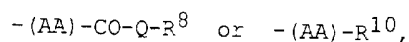
30



35 in which R⁶ is hydrogen or lower alkyl, and

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5 R^7 is hydrogen; aryloxy-carbonyl; aroyl optionally substituted with a substituent selected from the group consisting of acyl-ar(lower)alkenyl, acyl-ar(lower)alkoxy, acyl-aryloxy(lower)alkyl and acyl-ar(lower)alkyl; heterocyclic-carbonyl optionally substituted with acyl-ar(lower)alkenyl; acyl(lower)alkanoyl; hydroxy(lower)alkanoyl; acyloxy(lower)alkanoyl; carbamoyl optionally substituted with acyl(lower)alkyl; or a group of the formula :



15 in which R^8 is arylthio, aryloxy or arylamino, each of which is optionally substituted with substituent(s) selected from the group consisting of acyl, heterocyclic(lower)alkyl, heterocyclic(lower)alkenyl, nitro,
 20 amino and acylamino; heterocyclicthio or heterocyclicamino, each of which is optionally substituted with substituent(s) selected from the group consisting of acyl, acylamino, amino and lower alkoxy; halogen;
 25 tri(lower)alkylphosphonic; aryl substituted with substituent(s) selected from the group consisting of lower alkyl, lower alkoxy, acyl(lower)alkenyl, heterocyclic(lower)alkenyl, nitro, acyl,
 30 acyl(lower)alkoxy, guanidino, amino, acylamino, N-acyl-N-[heterocyclic(lower)-alkyl]amino and an N-containing heterocyclic-N-yl group substituted with oxo; or
 35 a heterocyclic group optionally substituted with substituent(s) selected from the group

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consisting of oxo, lower alkyl, lower alkoxy,
 nitro-aryl, acyl, acylamino, amino, N-acyl-N-
 (lower)alkylamino, lower alkylamino, halogen,
 heterocyclic(lower)alkyl,
 heterocyclic(lower)alkenyl and an N-containing
 heterocyclic-N-yl group substituted with oxo;

R¹⁰ is hydrogen or acylbiphenyl,

(AA) is amino acid residue, and

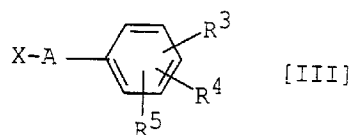
Q is lower alkylene, lower alkenylene or single
 bond,

A is lower alkylene, and

Y is O or N-R¹¹, in which R¹¹ is hydrogen or an N-protective
 group.

The object compound [I] or its salt can be prepared by
 processes as illustrated in the following reaction schemes.

Process 1



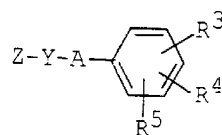
or its salt

Z - YH

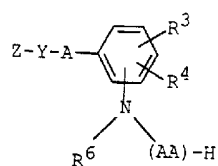
[II]

or its salt

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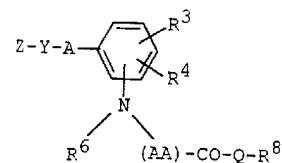
[I]
or its salt

Process 2

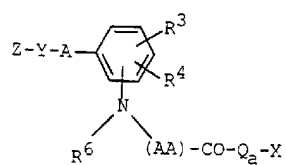
[IV]
or its salt

 $\text{R}^8\text{-Q-COOH}$ [V]

or its reactive
derivative at the
carboxy group or
a salt thereof



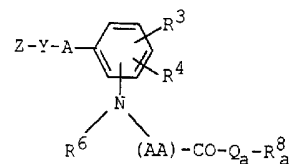
[Ia]
or its salt

Process 3

[VI]
or its salt

 $\text{R}_a^8\text{-H}$ [VII]

or its salt



[Ib]
or its salt

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wherein R_a^8 is arylthio optionally substituted with
substituent(s) selected from the group
consisting of acyl, amino and acylamino; or
heterocyclicthio optionally substituted with
substituent(s) selected from the group
consisting of acyl, acylamino, amino and lower
alkoxy;

Q_a is lower alkylene,
X is a leaving group, and
 R^3 , R^4 , R^5 , R^6 , R^8 , A, Y, Z, (AA) and Q are
each as defined above.

In the above and subsequent description of the present
specification, suitable examples of the various definitions
to be included within the scope of the invention are
explained in detail in the following.

The term "lower" is intended to mean a group having 1 to
6 carbon atom(s), unless otherwise provided.

In this respect, the term "lower" in lower alkenyl
moiety, heterocyclic(lower)alkenyl moiety, acyl(lower)alkenyl
moiety and ar(lower)alkenyl moiety in the various definitions
is intended to mean a group having 2 to 6 carbon atoms.

Further, the term "lower" in ar(lower)alkenoyl moiety
and heterocyclic(lower)alkenoyl moiety in the various
definitions is intended to mean a group having 3 to 6 carbon
atoms.

Suitable "lower alkyl" and lower alkyl moiety such as in
the terms "heterocyclic(lower)alkyl", "acyl(lower)alkyl",
"lower alkylthio", "N-acyl-N-(lower)alkylamino",
"hydroxy(lower)alkyl", "lower alkoxy(lower)alkyl",
"tri(lower)alkylphosphonic", "lower alkylamino", etc., may be
straight or branched one such as methyl, ethyl, propyl,
isopropyl, butyl, isobutyl, tert-butyl, pentyl, hexyl or the
like, in which preferable one is C_1 - C_4 alkyl such as methyl,

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ethyl, propyl, isobutyl or tert-butyl.

Suitable "cyclo(lower)alkoxy" may be cyclo(C₃-C₆)alkoxy such as cyclopropyloxy, cyclobutyloxy, cyclopentyloxy, cyclohexyloxy or the like.

5 Suitable "lower alkoxy" and lower alkoxy moiety such as in the terms "acyl(lower)alkoxy", "lower alkoxy(lower)alkyl", etc., may be straight or branched one such as methoxy, ethoxy, propoxy, isopropoxy, butoxy, isobutoxy, tert-butoxy, pentyloxy, hexyloxy or the like, in which preferable one is
10 C₁-C₄ alkoxy such as methoxy, ethoxy or isopropoxy.

Suitable "esterified carboxy" may be lower
alkoxycarbonyl [e.g. methoxycarbonyl, ethoxycarbonyl, propoxycarbonyl, butoxycarbonyl, isopropoxycarbonyl, tert-butoxycarbonyl, etc.], ar(lower)alkoxycarbonyl [e.g.
15 benzyloxycarbonyl, etc.] or the like.

Suitable "halo(lower)alkoxy" may be chloromethoxy, trifluoromethoxy, trifluoroethoxy, trifluoropropoxy or the like.

Suitable lower alkenyl moiety such as in the terms
20 "lower alkenylamino", "heterocyclic(lower)alkenyl", etc., may be a straight or branched one such as vinyl, allyl, 1-propenyl, isopropenyl, butenyl, isobutenyl, pentenyl, hexenyl or the like.

Suitable "halogen" may be fluorine, chlorine, bromine
25 and iodine.

Suitable "acyl" and acyl moiety such as in the terms "acylamino", "acyl(lower)alkyl", "acyl(lower)alkoxy", "acyl-ar(lower)alkenylaroyl", "N-acyl-N-(lower)alkylamino", etc., may be lower alkanoyl [e.g. formyl, acetyl, propionyl, butyryl, isobutyryl, valeryl, isovaleryl, pivaloyl, hexanoyl, 3,3-dimethylbutyryl, etc.], halo(lower)alkanoyl [e.g.
30 chloroacetyl, trifluoroacetyl, bromoacetyl, bromobutyryl, heptafluorobutyryl, etc.], heterocyclic(lower)alkanoyl optionally substituted with lower alkyl [e.g. pyridylacetyl, methylpyridylacetyl, ethylpyridylacetyl, etc.], lower
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alkoxy(lower)alkanoyl [e.g. methoxyacetyl, methoxypropionyl, ethoxyacetyl, etc.], carboxy, esterified carboxy such as lower alkoxycarbonyl [e.g. methoxycarbonyl, ethoxycarbonyl, propoxycarbonyl, isopropoxycarbonyl, butoxycarbonyl, isobutoxycarbonyl, tert-butoxycarbonyl, pentyloxycarbonyl, hexyloxycarbonyl, etc.], aryloxycarbonyl [e.g. phenoxycarbonyl, etc.], heterocycliccarbonyl optionally substituted with lower alkyl, lower alkoxy or lower alkylthio [e.g. pyridylcarbonyl, pyrazinylcarbonyl, isoquinolylcarbonyl, thiazolylcarbonyl, oxazolylcarbonyl, methylpyridylcarbonyl, methylpyrazolylcarbonyl, methoxypyridylcarbonyl, methylthiopyridylcarbonyl, etc.], carbamoyl, lower alkylcarbamoyl [e.g. methylcarbamoyl, ethylcarbamoyl, propylcarbamoyl, isopropylcarbamoyl, butylcarbamoyl, isobutylcarbamoyl, tert-butylcarbamoyl, pentylcarbamoyl, dimethylcarbamoyl, diethylcarbamoyl, N-ethyl-N-methylcarbamoyl, etc.], lower alkylamino(lower)alkylcarbamoyl [e.g. methylaminomethylcarbamoyl, methylaminoethylcarbamoyl, dimethylaminoethylcarbamoyl, etc.], N-[lower alkylamino(lower)alkyl]-N-(lower alkyl)carbamoyl [e.g. N-(methylaminoethyl)-N-methylcarbamoyl, N-(dimethylaminoethyl)-N-methylcarbamoyl, etc.], arylcarbamoyl optionally substituted with lower alkylcarbamoyl [e.g. phenylcarbamoyl, naphthylcarbamoyl, tolylcarbamoyl, methylcarbamoylphenylcarbamoyl, dimethylcarbamoylphenylcarbamoyl, etc.], heterocycliccarbamoyl optionally substituted with lower alkyl, lower alkoxy, lower alkylthio or oxo [e.g. pyridylcarbamoyl, or its oxide, pyrazinylcarbamoyl, isoquinolylcarbamoyl, thiazolylcarbamoyl, oxazolylcarbamoyl, methyloxazolylcarbamoyl, methylpyrazolylcarbamoyl, methylpyridylcarbamoyl, methoxypyridylcarbamoyl, methylthiopyridylcarbamoyl, etc.], ar(lower)alkylcarbamoyl [e.g. benzylcarbamoyl, phenethylcarbamoyl, etc.],

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heterocyclic(lower)alkylcarbamoyl [e.g. pyridylmethylcarbamoyl, pyrazinylmethylcarbamoyl, pyrimidinylmethylcarbamoyl, etc.],
lower alkylsulfonylcarbamoyl [e.g. methylsulfonylcarbamoyl, ethylsulfonylcarbamoyl, etc.], arylsulfonylcarbamoyl [e.g. phenylsulfonylcarbamoyl, tolylsulfonylcarbamoyl, etc.],
ar(lower)alkenoyl substituted with lower alkylcarbamoyl [e.g. methylcarbamoylcinnamoyl, dimethylcarbamoylcinnamoyl, etc.],
ar(lower)alkenoyl substituted with lower alkanoylamino [e.g. acetylaminocinnamoyl, etc.], heterocyclic(lower)alkenoyl
substituted with lower alkylcarbamoyl [e.g. methylcarbamoylpyridylacryloyl, dimethylcarbamoylpyridylacryloyl, etc.],
heterocyclic(lower)alkenoyl substituted with lower
alkanoylamino [e.g. acetylaminopyridylacryloyl, etc.],
lower alkylsulfonyl [e.g. methylsulfonyl, ethylsulfonyl, propylsulfonyl, isopropylsulfonyl, tert-butylsulfonyl, pentylsulfonyl, etc.], phthaloyl, or the like.

Suitable "aryl" and aryl moiety such as in the terms
"aryloxy", "aryloxy(lower)alkyl", "arylamino", "nitro-aryl",
"ar(lower)alkenoyl", etc., may be phenyl, naphthyl, phenyl
or naphthyl substituted with lower alkyl [e.g. tolyl, xylyl, mesityl, cumenyl, di(tert-butyl)phenyl, methylnaphthyl, etc.]
and the like, in which preferable one is phenyl, naphthyl and tolyl.

Suitable "aroyl" may be benzoyl, toluoyl, xyloyl, naphthoyl or the like.

Suitable "ar(lower)alkyl" may be benzyl, phenethyl, phenylpropyl, naphthylmethyl, benzhydryl, trityl or the like.

Suitable "ar(lower)alkoxy" may be benzyloxy, phenethyloxy, phenylpropoxy, naphthylmethoxy or the like.

Suitable "ar(lower)alkenyl" may be phenylvinyl, naphthylvinyl, phenylpropenyl or the like.

Suitable lower alkanoyl moiety in the terms

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"acyl(lower)alkanoyl", "hydroxy(lower)alkanoyl" and "acyloxy(lower)alkanoyl" may be formyl, acetyl, propionyl, butyryl, isobutyryl, valeryl, hexanoyl or the like.

- 5 Suitable "heterocyclic group" and heterocyclic moiety such as in the terms "heterocyclic(lower)alkyl", "heterocyclic(lower)alkenyl", "heterocyclic(lower)alkanoyl", "heterocycliccarbonyl", "heterocycliccarbamoyl", "heterocyclic(lower)alkylcarbamoyl",
10 "heterocyclic(lower)alkenoyl", "heterocyclicthio", "heterocyclicamino", etc., may be saturated or unsaturated, monocyclic or polycyclic heterocyclic group containing at least one hetero-atom such as an oxygen, sulfur and/or nitrogen atom such as :
15 -unsaturated 3 to 8-membered, preferably 5 or 6-membered heteromonocyclic group containing 1 to 4 nitrogen atom(s), for example, pyrrolyl, pyrrolinyl, imidazolyl, pyrazolyl, pyridyl, and its N-oxide, pyrimidinyl, pyrazinyl, pyridazinyl, triazolyl, tetrazolyl, dihydrotriazinyl, etc.;
20 -saturated 3 to 8-membered, preferably 4 or 6-membered heteromonocyclic group containing 1 to 4 nitrogen atom(s), for example, azetidiny, pyrrolidinyl, imidazolidinyl, piperidyl, pyrazolidinyl, piperazinyl, etc.;
25 -unsaturated condensed 7 to 12-membered heterocyclic group containing 1 to 5 nitrogen atom(s), for example, indolyl, isoindolyl, indolizinyl, benzimidazolyl, quinolyl, isoquinolyl, tetrahydroquinolyl, indazolyl, benzotriazolyl, imidazopyridyl, etc.;
30 -unsaturated 3 to 8-membered, preferably 5 or 6-membered heteromonocyclic group containing an oxygen atom, for example, furyl, etc.;
 -unsaturated condensed 7 to 12-membered heterocyclic group containing 1 to 2 oxygen atom(s), for example, benzofuryl, piperonyl, etc.;
35 -unsaturated 3 to 8-membered, preferably 5 or 6-membered

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heteromonocyclic group containing a sulfur atom, for example, thienyl, etc.;

-unsaturated condensed 7 to 12-membered heterocyclic group containing 1 to 2 sulfur atom(s), for example, benzothienyl, etc.;

-unsaturated 3 to 8-membered, preferably 5 or 6-membered heteromonocyclic group containing 1 to 2 oxygen atom(s) and 1 to 3 nitrogen atom(s), for example, oxazolyl, isoxazolyl, oxadiazolyl, etc.;

-saturated 3 to 8-membered, preferably 5 or 6-membered heteromonocyclic group containing 1 to 2 oxygen atom(s) and 1 to 3 nitrogen atom(s), for example, morpholinyl, etc.;

-unsaturated condensed 7 to 12-membered heterocyclic group containing 1 to 2 oxygen atom(s) and 1 to 3 nitrogen atom(s), for example, benzoxazolyl, benzoxadiazolyl, etc.;

-unsaturated 3 to 8-membered, preferably 5 or 6-membered heteromonocyclic group containing 1 to 2 sulfur atom(s) and 1 to 3 nitrogen atom(s), for example, thiazolyl, isothiazolyl, thiazolinyl, thiadiazolyl, etc.;

-saturated 3 to 8-membered, preferably 5 or 6-membered heteromonocyclic group containing 1 to 2 sulfur atom(s) and 1 to 3 nitrogen atom(s), for example, thiazolidinyl, etc.;

-unsaturated condensed 7 to 12-membered heterocyclic group containing 1 to 2 sulfur atom(s) and 1 to 3 nitrogen atom(s), for example, benzothiazolyl, benzothiadiazolyl, benzothiazinyl, benzothiazolinyl, etc., or the like.

Suitable "N-containing heterocyclic-N-yl group" may be morpholino, thiomorpholino, pyrrolidin-1-yl, piperidino, 1,2,3,6-tetrahydropyridin-1-yl, 1,2-dihydropyridin-1-yl, piperazin-1-yl, or the like.

Suitable "amino acid residue" may include natural or artificial ones, and such amino acid may be glycine, sarcosine, alanine, β -alanine, valine, norvaline, leucine, isoleucine, norleucine, serine, threonine, cysteine,

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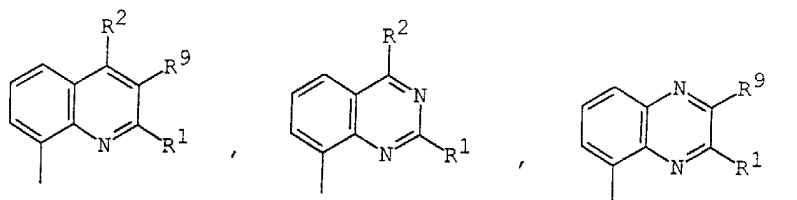
methionine, phenylalanine, phenylglycine, tryptophan,
tyrosine, proline, hydroxyproline, glutamic acid, aspartic
acid, glutamine, asparagine, lysine, arginine, histidine,
ornithine, or the like, in which more preferable one is
5 glycine, sarcosine, alanine, β -alanine and proline, and the
most preferable one is glycine.

Suitable "lower alkylene" may be a straight or branched
one such as methylene, ethylene, trimethylene,
methylmethylene, tetramethylene, ethylethylene, propylene,
10 pentamethylene, hexamethylene or the like, in which the most
preferable one are methylene and ethylene.

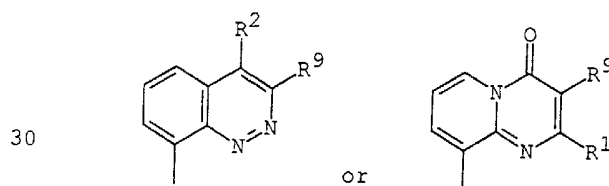
Suitable "lower alkenylene" may be a straight or
branched C_2 - C_6 alkenylene such as vinylene, methylvinylene,
propenylene, 1,3-butadienylene or the like, in which the most
15 preferable one is vinylene.

Suitable examples of Z may be a group of the formula :

20



25



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35 wherein R^1 , R^2 and R^9 are each as defined above.

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Suitable "N-protective group" may be ar(lower)alkoxycarbonyl [e.g. benzyloxycarbonyl, etc.], lower alkoxycarbonyl [e.g. tert-butoxycarbonyl, etc.] or the like.

5 Suitable "a leaving group" may be a conventional acid residue such as halogen [e.g. fluoro, chloro, bromo and iodo], arenesulfonyloxy [e.g. benzenesulfonyloxy, tosyloxy, etc.], alkanesulfonyloxy [e.g. mesyloxy, ethanesulfonyloxy, etc.], and the like.

10 Suitable pharmaceutically acceptable salts of the object compound [I] are conventional non-toxic salts and include a metal salt such as an alkali metal salt [e.g. sodium salt, potassium salt, etc.] and an alkaline earth metal salt [e.g. calcium salt, magnesium salt, etc.], an ammonium salt, an organic base salt [e.g. trimethylamine salt, triethylamine salt, pyridine salt, picoline salt, dicyclohexylamine salt, 15 N,N'-dibenzylethylenediamine salt, etc.], an organic acid addition salt [e.g. formate, acetate, trifluoroacetate, maleate, tartrate, oxalate, methanesulfonate, benzenesulfonate, toluenesulfonate, etc.], an inorganic acid 20 addition salt [e.g. hydrochloride, hydrobromide, sulfate, phosphate, etc.], a salt with an amino acid [e.g. arginine salt, aspartic acid salt, glutamic acid salt, etc.], an intramolecular salt and the like.

25 With respect to the salts of the compounds [Ia] and [Ib] in the Processes 2 and 3, it is to be noted that these compounds are included within the scope of the compound [I], and accordingly the suitable examples of the salts of these compounds are to be referred to those as exemplified for the object compound [I].

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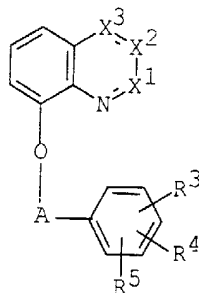
Preferred embodiments of the object compound [I] are as follows :

a) a compound of the formula :

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[I']

wherein

X¹ is N or C-R¹,

X² is N or C-R⁹,

15 X³ is N or C-R²,

R¹ is lower alkyl,

R² is hydrogen; lower alkyl; aryl; hydroxy(lower)alkyl;

lower alkoxy(lower)alkyl; carboxy; esterified carboxy;

carbamoyl optionally substituted with lower alkyl;

20 cyclo(lower)alkoxy; lower alkoxy optionally substituted
with a substituent selected from the group consisting of
lower alkoxy, lower alkylamino, hydroxy, carboxy,

esterified carboxy and carbamoyl optionally substituted

with lower alkyl; halo(lower)alkoxy; lower alkylamino

25 optionally substituted with a substituent selected from
the group consisting of lower alkoxy, lower alkylamino
and esterified carboxy; lower alkenylamino; or

an N-containing heterocyclic-N-yl group,

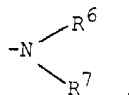
R³ is hydrogen, lower alkyl, lower alkoxy or halogen,

30 R⁴ is lower alkyl, lower alkoxy or halogen,

R⁵ is hydroxy; lower alkoxy optionally substituted with a
substituent selected from the group consisting of amino,
acylamino and lower alkoxy; piperazinyl substituted with
acyl(lower)alkyl and oxo; or a group of the formula :

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5 in which R⁶ is hydrogen or lower alkyl, and
 R⁷ is aryloxy carbonyl; acyl-ar(lower)alkenylaroyl;
 carbamoyl optionally substituted with
 acyl(lower)alkyl; or a group of the formula :

10 $-(\text{AA})-\text{CO}-\text{Q}-\text{R}^8$

in which R⁸ is arylthio, aryloxy or arylamino, each of which
 is optionally substituted with substituent(s)
 selected from the group consisting of acyl,
 15 amino and acylamino; heterocyclicthio or
 heterocyclicamino, each of which is optionally
 substituted with substituent(s) selected from
 the group consisting of acyl, acylamino, amino
 and lower alkoxy; halogen;
 20 tri(lower)alkylphosphonio; aryl substituted
 with substituent(s) selected from the group
 consisting of lower alkyl, lower alkoxy,
 nitro, acyl, acyl(lower)alkoxy, amino,
 acylamino and an N-containing heterocyclic-N-
 25 yl group substituted with oxo; or
 a heterocyclic group optionally substituted
 with substituent(s) selected from the group
 consisting of oxo, lower alkyl, lower alkoxy,
 nitro-aryl, acyl, acylamino, amino, N-acyl-N-
 30 (lower)alkylamino, lower alkyl, lower
 alkylamino, halogen, lower alkoxy,
 heterocyclic(lower)alkyl,
 heterocyclic(lower)alkenyl and an N-containing
 heterocyclic-N-yl group substituted with oxo;
 35 (AA) is amino acid residue, and

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Q is lower alkylene, lower alkenylene or single bond,

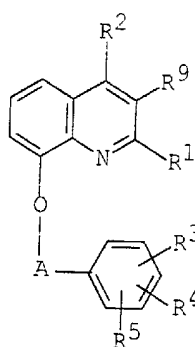
R⁹ is hydrogen or lower alkyl, and

A is lower alkylene, and

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b) a compound of the formula :

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[I']

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wherein

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R¹ is lower alkyl,

R² is hydrogen; cyclo(lower)alkoxy; lower alkoxy optionally substituted with a substituent selected from the group consisting of lower alkoxy, lower alkylamino, hydroxy, carboxy, esterified carboxy and carbamoyl optionally substituted with lower alkyl; halo(lower)alkoxy; lower alkylamino optionally substituted with a substituent selected from the group consisting of lower alkoxy, lower alkylamino and esterified carboxy; lower alkenylamino; or an N-containing heterocyclic-N-yl group,

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R³ is hydrogen, lower alkyl or halogen,

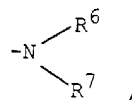
R⁴ is lower alkyl or halogen,

R⁵ is hydroxy; lower alkoxy optionally substituted with a substituent selected from the group consisting of amino, acylamino and lower alkoxy; piperazinyl substituted with

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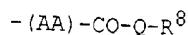
acyl(lower)alkyl and oxo; or a group of the formula :



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in which R^6 is hydrogen or lower alkyl, and
 R^7 is aryloxy, carbonyl, carbamoyl optionally
 substituted with acyl(lower)alkyl;
 or a group of the formula :

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in which R^8 is arylthio, aryloxy or arylamino, each of which
 is optionally substituted with substituent(s)
 selected from the group consisting of acyl,
 amino and acylamino; heterocyclicthio or
 heterocyclicamino, each of which is optionally
 substituted with substituent(s) selected from
 the group consisting of acyl, acylamino, amino
 and lower alkoxy; halogen;
 tri(lower)alkylphosphonio;
 aryl substituted with substituent(s) selected
 from the group consisting of acyl,
 acyl(lower)alkoxy, amino and acylamino; or
 a heterocyclic group optionally substituted
 with substituent(s) selected from the group
 consisting of nitro-aryl, acyl, acylamino,
 amino, N-acyl-N-(lower)alkylamino, lower
 alkyl, lower alkylamino, halogen, lower
 alkoxy, heterocyclic(lower)alkyl and an
 N-containing heterocyclic-N-yl group
 substituted with oxo;
 (AA) is amino acid residue, and
 Q is lower alkylene, lower alkenylene or single

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bond,
R⁹ is hydrogen or lower alkyl, and
A is lower alkylene.

5 The processes for preparing the object compound [I] are explained in detail in the following.

Process 1

10 The object compound [I] or its salt can be prepared by reacting a compound [II] or its salt with a compound [III] or its salt.

Suitable salts of the compounds [II] and [III] may be the same as those exemplified for the compound [I].

15 The reaction is preferably carried out in the presence of a base such as alkali metal [e.g. lithium, sodium, potassium, etc.], the hydroxide or carbonate or bicarbonate thereof [e.g. sodium hydroxide, potassium carbonate, potassium bicarbonate, etc.], alkali metal alkoxide [e.g. sodium methoxide, sodium ethoxide, potassium tert-butoxide, etc.], or the like.

20 This reaction is usually carried out in a conventional solvent such as tetrahydrofuran, dioxane, N,N-dimethylformamide, acetone, or the like.

25 The reaction temperature is not critical, and the reaction is usually carried out under cooling to heating.

Process 2

30 The object compound [Ia] or its salt can be prepared by reacting a compound [IV] or its salt with a compound [V] or its reactive derivative at the carboxy group or a salt thereof.

Suitable reactive derivative at the carboxy group of the compound [V] may include an acid halide, an acid anhydride, an activated amide, an activated ester, and the like.

35 Suitable examples of the reactive derivatives may be an acid

- 20 -

chloride; an acid azide; a mixed acid anhydride with an acid such as dialkylphosphoric acid, sulfuric acid, aliphatic carboxylic acid or aromatic carboxylic acid; a symmetrical acid anhydride; an activated amide with
5 imidazole; or an activated ester [e.g. p-nitrophenyl ester, etc.]. These reactive derivatives can optionally be selected from them according to the kind of the compound [V] to be used.

10 Suitable salts of the compound [IV] can be referred to the organic or inorganic acid addition salts as exemplified for the compound [I].

Suitable salts of the compound [V] and its reactive derivative can be referred to the ones as exemplified for the compound [I].

15 The reaction is usually carried out in a conventional solvent, such as methylene chloride, chloroform, pyridine, dioxane, tetrahydrofuran, N,N-dimethylformamide, or the like. In case that the compound [V] is used in the free acid form or salt form, it is to carry out the reaction in the presence
20 of a conventional condensing agent such as 1-ethyl-3-(3-dimethylaminopropyl)carbodiimide, N,N'-dicyclohexylcarbodiimide or the like.

The reaction temperature is not critical and the reaction can be carried out under cooling, at ambient
25 temperature, or under heating.

This reaction is preferably carried out in the presence of a conventional inorganic base or in the presence of a conventional organic base.

30 Process 3

The object compound [Ib] or its salt can be prepared by reacting a compound [VI] or its salt with a compound [VII] or its salt.

35 Suitable salts of the compound [VI] can be referred to the organic or inorganic acid addition salt as exemplified

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for the compound [I].

Suitable salts of the compound [VII] can be referred to the ones as exemplified for the compound [I].

5 This reaction can be carried out in substantially the same manner as Process 1, and therefore the reaction mode and reaction condition of this reaction are to be referred to those explained in Process 1.

10 The object compound [I] and the starting compounds can also be prepared by the methods of Examples and Preparations mentioned below or similar manners thereto or conventional manners.

15 The compounds obtained by the above processes can be isolated and purified by a conventional method such as pulverization, recrystallization, chromatography, reprecipitation or the like.

20 It is to be noted that the compound [I] and the other compounds may include one or more stereoisomers and geometrical isomers due to asymmetric carbon atoms and double bonds, and all of such isomers and mixture thereof are included within the scop of this invention.

25 The object compound [I] and pharmaceutically acceptable salts thereof possess strong activities as bradykinin antagonists, and are useful for the treatment and/or the prevention of bradykinin or its analogues mediated diseases such as allergy, inflammation, autoimmune disease, shock, pain, or the like, and more particularly for the prevention and/or the treatment of asthma, cough, bronchitis, rhinitis, rhinorrhea, obstructive pulmonary disease [e.g. pulmonary
30 emphysema, etc.], expectoration, pneumonitis, systemic inflammatory response syndrome (SIRS), septic shock, endotoxin shock, anaphylactic shock, adult respiratory distress syndrome, disseminated intravascular coagulopathy, arthritis, rheumatism, osteoarthritis, lumbago, inflammation-
35 induced bone resorption, conjunctivitis, vernal

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conjunctivitis, uveitis, iritis, iridocyclitis, headache, migraine, toothache, backache, superficial pain, cancerous pain, postoperative pain, tenalgia, trauma [e.g. wound, burn, etc.], rash, erythema, eczema or dermatitis [e.g. contact dermatitis, atopic dermatitis, etc.], urticaria, herpes, itching, psoriasis, lichen, inflammatory bowel disease [e.g. ulcerative colitis, Crohn's disease, etc.], diarrhea, emesis, hepatitis, pancreatitis, gastritis, esophagitis, food allergy, ulcer, irritable bowel syndrome, nephritis, angina, periodontitis, edema, hereditary angioneurotic edema, cerebral edema, low blood pressure, thrombosis, myocardial infarction, cerebral vasospasm, congestion, coagulation, gout, central nervous system injury, premature labor, arteriosclerosis (hyperlipidemia, hypercholesterolemia), postgastrectomy dumping syndrome, carcinoid syndrome, altered sperm mobility, diabetic neuropathy, neuralgia, graft rejection in transplantation, or the like, in human being or animals.

And further, it is known that bradykinin relates to the release of mediators such as prostaglandins, leukotrienes, tachykinins, histamine, thromboxanes, or the like, so the compound [I] is expected to be useful for the prevention and/or the treatment of such mediators mediated diseases.

In order to illustrate the usefulness of the object compound [I], the pharmacological test data of some representative compounds of the compound [I] are shown in the following.

³H-Bradykinin receptor binding

(i) Test Method :

(a) Crude ileum membrane preparation

Male Hartly strain guinea pigs were sacrificed by

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decapitation. The ileum was removed and homogenized in buffer (50 mM trimethylaminoethanesulfonic acid (TES), 1 mM 1,10-phenanthroline pH 6.8). The homogenate was centrifuged (1000 xg, 20 minutes) to remove tissue clumps and the supernatant was centrifuged (100,000 xg, 60 minutes) to yield a pellet. The pellet was resuspended in buffer (50 mM TES, 1 mM 1,10-phenanthroline, 140 mg/% bacitracin, 1 mM dithiothreitol, 0.1% bovine serum albumin pH 6.8) and homogenized with a glass-teflon homogenizer to yield suspension which was referred to as crude membrane suspension. The obtained membrane suspension was stored at -80°C until use.

(b) ^3H -Bradykinin binding to the membrane

The frozen crude membrane suspension was thawed. In binding assays, ^3H -Bradykinin (0.06 nM) and drug (1×10^{-6} M) were incubated with 50 μl of the membrane suspension at room temperature for 60 minutes in a final volume of 250 μl . Separation of receptor-bound from free ^3H -Bradykinin is achieved by immediate filtration under vacuum and washed three times with 5 ml of ice-cold buffer (50 mM Tris-HCl pH 7.5). Non-specific binding was defined as binding in the presence of 0.1 μM Bradykinin. The radioactivity retained on rinsed filters was determined by a liquid-scintillation counter.

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(ii) Test Results

5	Test Compound (Example No.)	Inhibition % of ³ H-Bradykinin binding (concentration: 1 x 10 ⁻⁶ M)
	2-(14)	96
	10-(9) dihydrochloride	99
10	25-(2) dihydrochloride	96
	34-(3)	100
	37-(5) hydrochloride	100
	73-(4)	95
15	90-(2)	98

The effects of the compound [I] on bradykinin-induced bronchoconstriction and carrageenin-induced paw edema were measured according to similar manners described in British Journal of Pharmacology, 102, 774-777 (1991).

For therapeutic purpose, the compound [I] and a pharmaceutically acceptable salt thereof of the present invention can be used in a form of pharmaceutical preparation containing one of said compounds, as an active ingredient, in admixture with a pharmaceutically acceptable carrier such as an organic or inorganic solid, semi-solid or liquid excipient suitable for oral, parenteral such as intravenous, intramuscular, subcutaneous or intraarticular, external such as topical, enteral, intrarectal, transvaginal, inhalant, ophthalmic, nasal or hypoglossal administration. The pharmaceutical preparations may be capsules, tablets, dragees, granules, suppositories, solution, lotion, suspension, emulsion, ointment, gel, cream, or the like. If desired, there may be included in these preparations, auxiliary substances, stabilizing agents, wetting or

- 25 -

emulsifying agents, buffers and other commonly used additives.

5 While the dosage of the compound [I] will vary depending upon the age and condition of the patient, an average single dose of about 0.1 mg, 1 mg, 10 mg, 50 mg, 100 mg, 250 mg, 500 mg and 1000 mg of the compound [I] may be effective for preventing and/or treating the above-mentioned diseases. In
10 general, amounts between 0.1 mg/body and about 1,000 mg/body may be administered per day.

Examples

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- to be continued on the next page -

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The following Preparations and Examples are given for the purpose of illustrating this invention.

Preparation 1

5 To a suspension of 4-formylbenzoic acid (1.00 g) in dry tetrahydrofuran (15 ml) was added methyl(triphenylphosphoranylidene)acetate (2.50 g) at ambient temperature under nitrogen atmosphere. The reaction mixture was stirred for 1 hour at the same temperature, poured into
10 aqueous sodium bicarbonate solution, and washed with ethyl acetate. 1N-Hydrochloric acid was added to the aqueous layer until the layer was adjusted to pH 2. The aqueous layer was extracted with ethyl acetate. The organic layer was washed with water, dried over magnesium sulfate and evaporated in
15 vacuo. The residue was crystallized from diisopropyl ether to give methyl 4-carboxycinnamate (1.21 g) as colorless powder.

mp : 243°C

20 NMR (DMSO-d₆, δ) : 3.74 (3H, s), 6.76 (1H, d, J=16Hz), 7.73 (1H, d, J=16Hz), 7.85 (2H, d, J=8Hz), 7.96 (2H, d, J=8Hz)

Preparation 2

25 To a solution of methyl 4-carboxycinnamate (160 mg) in methylene chloride was added methylamine hydrochloride (58 mg) and 1-ethyl-3-(3-dimethylaminopropyl)carbodiimide (140 mg) at ambient temperature, and the mixture was stirred for 2 hours. To this suspension was added 1-hydroxybenzotriazole (137 mg) and dimethylformamide (2 ml), and the mixture was
30 stirred for 14 hours at same temperature. The reaction mixture was poured into water, and extracted with dichloromethane. The organic layer was washed with aqueous sodium bicarbonate solution and water, dried over magnesium sulfate, and evaporated in vacuo. The residue was
35 crystallized from diisopropyl ether to give methyl

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4-(methylcarbamoyl)cinnamate (82 mg) as a colorless powder.

mp : 210.5°C

NMR (DMSO-D₆, δ) : 2.79 (3H, d, J=5Hz), 3.74 (3H, s),
6.74 (1H, d, J=16Hz), 7.69 (1H, d, J=16Hz), 7.80
(2H, d, J=8Hz), 7.87 (2H, d, J=8Hz), 8.51 (1H,
q-like)

Preparation 3

To a solution of methyl 4-(methylcarbamoyl)cinnamate (75
mg) in methanol (3 ml) was added 1N aqueous sodium hydroxide
solution (0.5 ml) at 40°C. The mixture was stirred at same
temperature for 3 hours. 1N-Hydrochloric acid (0.5 ml) was
added to the reaction mixture and evaporated in vacuo. Water
was added to the residue, the mixture was filtered and the
residue was washed with diethyl ether to give 4-
(methylcarbamoyl)cinnamic acid (56 mg) as a colorless powder.

mp : >250°C

NMR (DMSO-d₆, δ) : 2.78 (3H, d, J=5Hz), 6.62 (1H, d,
J=16Hz), 7.61 (1H, d, J=16Hz), 7.77 (2H, d, J=8Hz),
7.85 (2H, d, J=8Hz), 8.51 (1H, q-like)

Preparation 4

A mixture of 2-acetylamino-5-formylpyridine (241 mg) and
malonic acid (168 mg) in pyridine (0.12 ml) and ethanol (0.36
ml) was refluxed for 2 hours. After cooling the mixture, the
precipitate was collected by filtration, and washed with
ethyl acetate to give (E)-3-(6-acetylamino-3-pyridyl)acrylic
acid (248 mg) as a colorless powder.

mp : 291-292°C

NMR (DMSO-d₆, δ) : 2.10 (3H, s), 6.55 (1H, d, J=16Hz),
7.58 (1H, d, J=16Hz), 8.07-8.21 (2H), 8.59 (1H,
br s)

Preparation 5

(E)-3-(6-Ethoxycarbonyl-3-pyridyl)acrylic acid (from

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ethyl 5-formyl-2-pyridinecarboxylate) was obtained according to a similar manner to that of Preparation 4.

mp : 201-202°C

5 NMR (DMSO-d₆, δ) : 1.33 (3H, t, J=7Hz), 4.36 (2H, q, J=7Hz), 6.80 (1H, d, J=16Hz), 7.69 (1H, d, J=16Hz), 8.07 (1H, d, J=9Hz), 8.33 (1H, dd, J=9, 2Hz), 9.00 (1H, d, J=2Hz)

Preparation 6

10 To a mixture of sodium hydride (40% in oil, 2.64 g) and N,N-dimethylformamide (100 ml) was added 8-hydroxy-2-methylquinoline (10 g) in an ice-water bath. The mixture was stirred for 30 minutes at the same temperature and then 2,6-dichloro-3-nitrobenzyl chloride (15.1 g) and
15 tetrabutylammonium iodide (100 mg) were added therein. The reaction mixture was stirred at ambient temperature for 1 hour. To this mixture was added water (100 ml) in an ice-water bath. The precipitates were collected by vacuum
20 filtration and washed with water (60 ml) to give 8-(2,6-dichloro-3-nitrobenzyloxy)-2-methylquinoline (20.36 g) as a powder.

NMR (CDCl₃, δ) : 2.76 (3H, s), 5.70 (2H, s), 7.21-7.57 (5H), 7.76 (1H, d, J=8Hz), 8.02 (1H, d, J=8Hz)

25 Preparation 7

The following compounds were obtained according to a similar manner to that of Preparation 6.

30 (1) 4-Chloro-8-(2,6-dichloro-3-nitrobenzyloxy)-2-methylquinoline

NMR (CDCl₃, δ) : 2.70 (3H, s), 5.67 (2H, s), 7.23-7.92 (6H)

35 (2) 8-(2,6-Dichloro-3-nitrobenzyloxy)-4-methoxy-2-methylquinoline

- 29 -

NMR (CDCl₃, δ) : 2.70 (3H, s), 4.02 (3H, s), 5.68 (2H, s), 6.67 (1H, s), 7.25 (1H, dd, J=8, 1Hz), 7.34 (1H, t, J=8Hz), 7.50 (1H, d, J=8Hz), 7.75 (1H, d, J=8Hz), 7.84 (1H, dd, J=8, 1Hz)

5

Preparation 8

To a mixture of 8-(2,6-dichloro-3-nitrobenzyloxy)-2-methylquinoline (1.0 g), concentrated hydrochloric acid (5.2 ml) and methanol (5.2 ml) was added iron powder (666 mg).
10 The mixture was heated under reflux for 2 hours and stirred in an ice-water bath for 1 hour. The precipitate was collected by vacuum filtration and washed with 1N hydrochloric acid and water to give 8-(3-amino-2,6-dichlorobenzyloxy)-2-methylquinoline dihydrochloride (635 mg)
15 as a brownish powder.

NMR (DMSO-d₆, δ) : 2.93 (3H, s), 5.50 (2H, s), 6.98 (1H, d, J=8Hz), 7.23 (1H, d, J=8Hz), 7.80-8.02 (4H), 9.03 (1H, d, J=8Hz)

20 Preparation 9

To a mixture of 8-(3-amino-2,6-dichlorobenzyloxy)-2-methylquinoline dihydrochloride (4.06 g),
4-dimethylaminopyridine (120 mg), N-methylpyrrolidone (30 ml) and pyridine (10 ml) was added phthalimidoacetyl chloride
25 (3.35 g) at ambient temperature. The mixture was stirred at 50°C for 1.5 hours and cooled in an ice-water bath. Water (40 ml) was added therein and the mixture was stirred for 30 minutes in an ice water bath. The precipitate was collected
30 by vacuum filtration and washed with water and ethyl acetate to give 8-[2,6-dichloro-3-(phthalimidoacetyl-amino)benzyloxy]-2-methylquinoline (4.45 g) as a yellowish powder.

NMR (CDCl₃, δ) : 2.86 (3H, s), 4.74 (2H, s), 5.51 (2H, s), 7.20-7.50 (5H), 7.63-7.93 (4H), 8.03 (1H, d, J=8Hz), 8.29 (1H, d, J=8Hz)

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- 30 -

Preparation 10

To a mixture of 8-[2,6-dichloro-3-(phthalimidoacetyl-amino)benzyloxy]-2-methylquinoline (4.44 g) and N,N-dimethylformamide (44 ml) was added sodium hydride (60% in oil, 375 mg) in an ice-water bath. After stirring for 30 minutes in an ice-water bath, methyl iodide (0.6 ml) was added thereto and the mixture was stirred at ambient temperature for 1 hour. To this mixture was added water (88 ml) in an ice-water bath and the mixture was stirred at the same temperature for 1.5 hours. The precipitate was collected by vacuum filtration and washed with water and methanol to give 8-[2,6-dichloro-3-[N-(phthalimidoacetyl)-N-methylamino]benzyloxy]-2-methylquinoline (3.99 g) as a yellow powder.

NMR (CDCl₃, δ) : 2.76 (3H, s), 3.23 (3H, s), 4.08 (2H, s), 5.68 (1H, d, J=12Hz), 5.75 (1H, d, J=12Hz), 7.24-7.59 (6H), 7.66-7.91 (4H), 8.03 (1H, d, J=8Hz)

Preparation 11

A mixture of 8-[2,6-dichloro-3-[N-(phthalimidoacetyl)-N-methylamino]benzyloxy]-2-methylquinoline (3.98 g), hydrazine monohydrate (0.72 ml) and ethanol (40 ml) was heated under reflux for 1 hour. The precipitate was removed by vacuum filtration and the filtrate was evaporated in vacuo. The residue was dissolved in dichloromethane and the precipitate was removed by vacuum filtration. The filtrate was evaporated in vacuo to give 8-[3-(N-glycyl-N-methylamino)-2,6-dichlorobenzyloxy]-2-methylquinoline (2.99 g) as a yellow amorphous powder.

NMR (CDCl₃, δ) : 2.76 (3H, s), 2.96 (1H, d, J=16Hz), 3.10 (1H, d, J=16Hz), 3.21 (3H, s), 5.66 (2H, s), 7.20-7.50 (6H), 8.02 (1H, d, J=8Hz)

Preparation 12

A mixture of 4-chloro-8-hydroxy-2-methylquinoline (9 g),

- 31 -

1,3-dimethyl-2-imidazolidinone (100 ml) and 28% solution of sodium methoxide in methanol (135 ml) was stirred at 150°C for 4 hours. The reaction mixture was cooled to ambient temperature followed by partition into ethyl acetate and water. The organic layer was washed with water and brine, dried over magnesium sulfate and concentrated in vacuo. The crystalline residue was washed with n-hexane to give 8-hydroxy-4-methoxy-2-methylquinoline (5.57 g).

mp : 110.5-112°C

NMR (CDCl₃, δ) : 2.67 (3H, s), 4.01 (3H, s), 6.63 (1H, s), 7.11 (1H, d, J=8Hz), 7.31 (1H, t, J=8Hz), 7.56 (1H, d, J=8Hz)

Preparation 13

The following compounds were obtained according to a similar manner to that of Preparation 12.

(1) 4-Ethoxy-8-hydroxy-2-methylquinoline

mp : 85-86°C

NMR (CDCl₃, δ) : 1.56 (3H, t, J=6Hz), 2.66 (3H, s), 4.23 (2H, q, J=6Hz), 6.60 (1H, s), 7.10 (1H, d, J=8Hz), 7.31 (1H, t, J=8Hz), 7.60 (1H, d, J=8Hz)

(2) 8-Hydroxy-4-(2-methoxyethoxy)-2-methylquinoline

NMR (CDCl₃, δ) : 2.40 (3H, s), 3.52 (3H, s), 3.91 (2H, t, J=6Hz), 4.32 (2H, t, J=6Hz), 6.64 (1H, s), 7.12 (1H, d, J=8Hz), 7.32 (1H, t, J=8Hz), 7.62 (1H, d, J=8Hz)

(3) 8-Hydroxy-2-methyl-4-(2-dimethylaminoethoxy)quinoline

mp : 94-96°C

NMR (CDCl₃, δ) : 2.40 (6H, s), 2.67 (3H, s), 2.91 (2H, t, J=6Hz), 4.29 (2H, t, J=6Hz), 6.63 (1H, s), 7.12 (1H, d, J=8Hz), 7.31 (1H, t, J=8Hz), 7.59 (1H, d, J=8Hz)

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(4) 8-Hydroxy-4-isopropoxy-2-methylquinoline

NMR (CDCl₃, δ) : 1.48 (6H, d, J=7.5Hz), 2.64 (3H, s),
4.75-4.86 (1H, m), 6.60 (1H, s), 7.10 (1H, d,
J=8Hz), 7.29 (1H, t, J=8Hz), 7.59 (1H, d, J=8Hz)

5

(5) 4-Cyclopentyloxy-8-hydroxy-2-methylquinoline

NMR (CDCl₃, δ) : 1.56-2.07 (8H, m), 2.66 (3H, s), 4.94-
5.02 (1H, m), 6.60 (1H, s), 7.10 (1H, d, J=8Hz),
7.29 (1H, t, J=8Hz), 7.55 (1H, d, J=8Hz)

10

Preparation 14

A mixture of 4-chloro-8-(2,6-dichloro-3-nitrobenzyloxy)-
2-methylquinoline (200 mg) and N,N-dimethylformamide (3 ml)
was heated under reflux for 18 hours. The reaction mixture
was partitioned into ethyl acetate and saturated aqueous
solution of sodium bicarbonate. The organic layer was washed
with water, dried over magnesium sulfate and evaporated in
vacuo. The residue was purified by preparative thin-layer
chromatography (dichloromethane-methanol) to give 8-hydroxy-
2-methyl-4-dimethylaminoquinoline (26 mg) as a brownish
powder.

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NMR (CDCl₃, δ) : 2.62 (3H, s), 3.03 (6H, s), 5.29 (1H,
br s), 6.63 (1H, s), 7.07 (1H, d, J=8Hz), 7.28 (1H,
t, J=8Hz), 7.46 (1H, d, J=8Hz)

25

Preparation 15

(1) To a suspension of 8-(2,6-dichloro-3-nitrobenzyloxy)-4-
methoxy-2-methylquinoline (1.75 g) in methanol (17 ml) was
added tin(II) chloride (3.37 g) at ambient temperature. The
mixture was refluxed for 1 hour. After cooling, the mixture
was adjusted to pH 10 with 1N sodium hydroxide solution. To
this mixture was added dichloromethane (50 ml) and the
precipitate was removed by filtration. The filtrate was
extracted with dichloromethane twice. The organic layer was
washed with water and brine. After dried over magnesium

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sulfate, the solvent was removed in vacuo to give 8-(3-amino-2,6-dichlorobenzyloxy)-4-methoxy-2-methylquinoline (1.16 g) as a colorless powder.

mp : >250°C

5 NMR (DMSO-d₆, δ) : 2.58 (3H, s), 4.00 (3H, s), 5.31 (2H, s), 5.68 (2H, br s), 6.90 (1H, d, J=8Hz), 7.23 (1H, d, J=8Hz), 7.31-7.46 (2H), 7.68 (1H, dd, J=8, 2Hz)

10 (2) 8-[2,6-Dichloro-3-(phthalimidoacetylaminobenzyloxy)-4-methoxy-2-methylquinoline was obtained according to a similar manner to that of Preparation 9.

mp : 184-185°C

15 NMR (CDCl₃, δ) : 2.62 (3H, s), 4.27 (3H, s), 4.78-5.02 (2H), 5.10-5.79 (2H), 6.60 (1H, br d, J=9Hz), 7.19-7.38 (2H), 7.58 (1H, t, J=9Hz), 7.70-7.99 (7H)

20 (3) 8-[2,6-Dichloro-3-[N-(phthalimidoacetyl)-N-methylamino]benzyloxy]-4-methoxy-2-methylquinoline was obtained according to a similar manner to that of Preparation 10.

mp : 209-210°C

25 NMR (CDCl₃, δ) : 2.70 (3H, s), 3.22 (2H, s), 3.99 (3H, s), 4.02 (2H, s), 5.65 (1H, d, J=10Hz), 5.72 (1H, d, J=10Hz), 6.63 (1H, s), 7.21-7.40 (2H), 7.46 (1H, d, J=9Hz), 7.53 (1H, d, J=9Hz), 7.68-7.91 (5H)

30 (4) 8-[3-(N-Glycyl-N-methylamino)-2,6-dichlorobenzyloxy]-4-methoxy-2-methylquinoline was obtained according to a similar manner to that of Preparation 11.

NMR (CDCl₃, δ) : 2.70 (3H, s), 2.95 (1H, d, J=17Hz), 3.10 (1H, d, J=17Hz), 3.21 (3H, s), 4.01 (3H, s), 5.62 (2H, s), 7.18-7.29 (2H), 7.33 (1H, t, J=8Hz), 7.46 (1H, d, J=9Hz), 7.32 (1H, d, J=8Hz)

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Preparation 16

A mixture of 4-chloro-8-hydroxy-2-methylquinoline (500 mg), N,N-dimethylethylenediamine (341 mg) and phenol (486 mg) was heated at 125°C for 18 hours. After cooling the reaction mixture, acetone (5 ml) was added thereto. The precipitates were collected by filtration and recrystallized from acetonitrile to give 4-(2-dimethylaminoethylamino)-8-hydroxy-2-methylquinoline hydrochloride (415 mg) as brown crystals.

mp : 248-250°C

NMR (DMSO-d₆, δ) : 2.45 (6H, s), 2.63 (3H, s), 3.81-2.92 (2H, m), 3.58-3.70 (2H, m), 6.72 (1H, s), 7.22 (1H, d, J=8Hz), 7.39 (1H, t, J=8Hz), 7.83 (1H, d, J=8Hz), 8.43 (1H, br s)

Preparation 17

The following compounds were obtained according to a similar manner to that of Preparation 16.

(1) 4-Ethoxycarbonylmethylamino-8-hydroxy-2-methylquinoline (from 4-chloro-8-hydroxy-2-methylquinoline and ethyl aminoacetate hydrochloride)

mp : 227-229°C

NMR (DMSO-d₆, δ) : 1.23 (3H, t, J=7Hz), 2.59 (3H, s), 4.18 (2H, q, J=7Hz), 4.29 (2H, br d, J=6Hz), 6.50 (1H, s), 7.15 (1H, d, J=7.5Hz), 7.36 (1H, t, J=7.5Hz), 7.69 (1H, d, J=7.5Hz), 8.35 (1H, br s)

(2) 4-Allylamino-8-hydroxy-2-methylquinoline (from 4-chloro-8-hydroxy-2-methylquinoline and allylamine)

mp : 263-264°C

NMR (DMSO-d₆, δ) : 2.66 (3H, s), 4.11-4.09 (2H, m), 5.18-5.30 (2H, m), 5.88-6.02 (1H, m), 6.67 (1H, s), 7.38 (1H, d, J=7.5Hz), 7.47 (1H, t, J=7.5Hz), 7.91 (1H, d, J=7.5Hz), 9.29 (1H, br t, J=6Hz)

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(3) 8-Hydroxy-4-(2-methoxyethylamino)-2-methylquinoline hydrochloride (from 4-chloro-8-hydroxy-2-methylquinoline and 2-methoxyethylamine)

mp : 235.8-239°C

5 NMR (DMSO-d₆, δ) : 2.65 (3H, s), 3.29 (3H, s), 3.59-3.61 (4H, m), 6.79 (1H, s), 7.31 (1H, d, J=8Hz), 7.43 (1H, t, J=8Hz), 7.89 (1H, d, J=8Hz), 8.90 (1H, br s)

10 (4) 4-[Bis(2-methoxyethyl)amino]-8-hydroxy-2-methylquinoline (from 4-chloro-8-hydroxy-2-methylquinoline and bis(2-methoxyethyl)amine)

15 NMR (CDCl₃, δ) : 2.63 (3H, br s), 3.29 (6H, s), 3.50-3.80 (8H, m), 6.85 (1H, br s), 7.06 (1H, d, J=8Hz), 7.29 (1H, br t, J=8Hz), 7.49 (1H, br d, J=8Hz)

(5) 8-Hydroxy-2-methyl-4-(piperidino)quinoline (from 4-chloro-8-hydroxy-2-methylquinoline and piperidine)

20 NMR (CDCl₃, δ) : 1.63-1.74 (2H, m), 1.79-1.89 (4H, m), 2.64 (3H, s), 3.15-3.22 (4H, m), 6.70 (1H, s), 7.06 (1H, d, J=8Hz), 7.28 (1H, t, J=8Hz), 7.39 (1H, d, J=8Hz)

25 (6) 8-Hydroxy-2-methyl-4-(morpholino)quinoline (from 4-chloro-8-hydroxy-2-methylquinoline and morpholine)

NMR (CDCl₃, δ) : 2.66 (3H, s), 3.24 (4H, t, J=5Hz), 3.98 (4H, t, J=5Hz), 6.74 (1H, s), 7.09 (1H, d, J=7.5Hz), 7.31 (1H, t, J=7.5Hz), 7.39 (1H, d, J=7.5Hz)

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Preparation 18

(1) To a solution of 2,6-dichloro-3-nitrobenzyl alcohol (5.0 g) in N,N-dimethylformamide (25 ml) were added imidazole (1.69 g) and tert-butyldiphenylsilyl chloride (6.0 ml) at
35 ambient temperature with stirring. After 8 hours, the

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mixture was diluted with water (25 ml) and was extracted with ethyl acetate twice. The organic layer was washed with water and brine, dried over magnesium sulfate. The solvent was removed in vacuo to give 1-(tert-butyldiphenylsilyloxy-methyl)-2,6-dichloro-3-nitrobenzene (11.5 g) as an oil.

NMR (CDCl₃, δ) : 1.05 (9H, s), 4.96 (2H, s), 7.27-7.51 (7H, m), 7.58-7.81 (5H, m)

(2) To a stirred mixture of 1-(tert-butyldiphenylsilyloxy-methyl)-2,6-dichloro-3-nitrobenzene (433 mg), ferric chloride hexahydrate (17.5 mg) and activated carbon (17.5 mg) in a mixture of methanol (2.78 ml) and water (0.69 ml) was added hydrazine monohydrate (0.135 ml) dropwise at 60-70°C. After the addition was finished, the mixture was refluxed for half an hour. The mixture was allowed to cool and filtered. The filtrate was concentrated in vacuo. The residue was extracted with dichloromethane and the organic phase was dried over anhydrous magnesium sulfate. After being filtered, the filtrate was concentrated in vacuo and the resulting residue was washed with n-hexane to give 3-amino-1-(tert-butyldiphenylsilyloxymethyl)-2,6-dichlorobenzene (348 mg) as a white mass.

NMR (CDCl₃, δ) : 1.05 (9H, s), 4.07 (2H, br s), 4.87 (2H, s), 6.66 (1H, d, J=9Hz), 7.08 (1H, d, J=9Hz), 7.30-7.50 (6H, m), 7.70-7.84 (4H, m)

(3) 1-(tert-Butyldiphenylsilyloxymethyl)-2,6-dichloro-3-(phthalimidoacetyl amino)benzene was obtained according to a similar manner to that of Preparation 9.

mp : 198.1°C

NMR (CDCl₃, δ) : 1.04 (9H, s), 4.57 (2H, s), 4.90 (2H, s), 7.25-7.50 (7H, m), 7.55-7.83 (6H, m), 7.85-8.07 (2H, m), 8.00 (1H, br s), 8.25 (1H, d, J=8Hz)

(4) 1-(tert-Butyldiphenylsilyloxymethyl)-2,6-dichloro-3-[N-

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methyl-N-(phthalimidoacetyl)amino]benzene was obtained according to a similar manner to that of Preparation 10.
mp : 167-172°C

5 NMR (CDCl₃, δ) : 1.06 (9H, s), 3.20 (3H, s), 4.04 (2H, s), 4.98 (2H, s), 7.31-7.51 (9H, m), 7.65-7.79 (6H, m), 7.80-7.92 (2H, m)

10 (5) 3-(N-Glycyl-N-methylamino)-1-(tert-butyldiphenylsilyloxymethyl)-2,6-dichlorobenzene was obtained according to a similar manner to that of Preparation 11.

NMR (CDCl₃, δ) : 1.05 (9H, s), 2.94 (1H, d, J=17Hz), 3.09 (1H, d, J=17Hz), 3.20 (3H, s), 4.93 (2H, s), 7.18 (1H, d, J=8Hz), 7.35-7.49 (7H, m), 7.69-7.77 (4H, m)

15

(6) 1-(tert-Butyldiphenylsilyloxymethyl)-2,6-dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)cinnamoylglycyl]amino]benzene was obtained by reacting 3-(N-glycyl-N-methylamino)-1-(tert-butyldiphenylsilyloxymethyl)-2,6-dichlorobenzene with 4-(methylcarbamoyl)cinnamic acid according to a similar manner to that of Example 1.
mp : 219-222°C

20 NMR (CDCl₃, δ) : 1.05 (9H, s), 3.02 (3H, d, J=5Hz), 3.21 (3H, s), 3.56 (1H, dd, J=17.4Hz), 3.93 (1H, dd, J=17, 5Hz), 4.91 (1H, d, J=10Hz), 4.98 (1H, d, J=10Hz), 6.15 (1H, br d, J=5Hz), 6.51 (1H, d, J=15Hz), 6.63 (1H, br s), 7.19-7.28 (2H, m), 7.32-7.48 (6H, m), 7.50-7.60 (3H, m), 7.68-7.78 (6H, m)

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30 (7) To a suspension of 1-(tert-butyldiphenylsilyloxymethyl)-2,6-dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)cinnamoylglycyl]amino]benzene (17.6 g) in tetrahydrofuran (138 ml) was added 1M tetrabutylammonium fluoride in tetrahydrofuran (38.4 ml) at ambient temperature. The
35 reaction mixture was stirred for 1 hour. The mixture was

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concentrated and diluted with dichloromethane. The organic layer was washed with 1N hydrochloric acid, saturated sodium bicarbonate solution and water, dried over magnesium sulfate and evaporated in vacuo to give 2,6-dichloro-1-hydroxymethyl-3-[N-methyl-N-[4-(methylcarbamoyl)cinnamoylglycyl]amino]-benzene (8.14 g).

mp : 207-211°C

NMR (DMSO-d₆, δ) : 2.79 (3H, d, J=5Hz), 3.11 (3H, s), 3.47 (1H, dd, J=17, 4Hz), 3.77 (1H, dd, J=17, 5Hz), 4.74 (1H, d, J=5Hz), 5.34 (1H, t, J=5Hz), 6.87 (1H, d, J=15Hz), 7.40 (1H, d, J=15Hz), 7.59-7.68 (4H, m), 7.85 (2H, d, J=8Hz), 8.29 (1H, t, J=5Hz), 8.48 (1H, d, J=5Hz)

(8) To a mixture of 2,6-dichloro-1-hydroxymethyl-3-[N-methyl-N-[4-(methylcarbamoyl)cinnamoylglycyl]amino]benzene (8.10 g) in dichloromethane (81 ml) was added triphenylphosphine (5.66 g) and carbon tetrabromide (8.95 g) at 0°C. After 15 minutes the reaction mixture was stirred at ambient temperature for 3 hours. To the mixture was added triphenylphosphine (1.42 g) and carbon tetrabromide (2.39 g) and stirred for another 2 hours. The reaction mixture was washed with saturated sodium hydrogen carbonate, water and brine. After dried over anhydrous magnesium sulfate, the mixture was filtered and evaporated in vacuo. The residue was purified by flash column chromatography eluting with dichloromethane:ethyl acetate (1:1, V/V) and dichloromethane:methanol (20:1, V/V) followed by crystallizing from ethyl acetate to give 2,6-dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)cinnamoylglycyl]amino]benzyl bromide (6.40 g) as pale yellow crystals.

mp : 211.6-216.5°C

NMR (CDCl₃, δ) : 3.02 (3H, d, J=5Hz), 3.27 (3H, s), 3.62 (1H, dd, J=17, 4Hz), 3.92 (1H, dd, J=17, 5Hz), 4.78 (1.2H, s), 4.90 (0.8H, s), 6.15 (1H, br d,

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J=5Hz), 6.51 (1H, d, J=15Hz), 6.67 (1H, br t, J=5Hz), 7.29 (1H, overlapped with H₂O), 7.45-7.62 (4H, m), 7.76 (2H, d, J=8Hz)

5 Preparation 19

(1) 3-[N-[(E)-3-(6-Acetamidopyridin-3-yl)acryloylglycyl]-N-methylamino]-1-[tert-butyldiphenylsilyloxymethyl]-2,6-dichlorobenzene was obtained by reacting 3-(N-glycyl-N-methylamino)-1-(tert-butyldiphenylsilyloxymethyl)-2,6-dichlorobenzene with (E)-3-(6-acetamidopyridin-3-yl)acrylic acid according to a similar manner to that of Preparation 18-(6).

mp : 194-196°C

15 NMR (CDCl₃, δ) : 1.06 (9H, s), 2.22 (3H, s), 3.23 (3H, s), 3.57 (1H, dd, J=17, 4Hz), 3.94 (1H, dd, J=17, 5Hz), 4.92 (1H, d, J=10Hz), 4.98 (1H, d, J=10Hz), 6.44 (1H, d, J=15Hz), 6.63 (1H, br s), 7.22 (1H, d, J=8Hz), 7.35-7.48 (6H, m), 7.52 (1H, d, J=15Hz), 7.70-7.77 (4H, m), 7.83 (1H, dd, J=8, 3Hz), 8.05 (1H, br s), 8.22 (1H, d, J=8Hz), 8.36 (1H, d, J=3Hz)

25 (2) 3-[N-[(E)-3-(6-Acetamidopyridin-3-yl)acryloylglycyl]-N-methylamino]-1-hydroxymethyl-2,6-dichlorobenzene was obtained according to a similar manner to that of Preparation 18-(7).

mp : 207-209°C

30 NMR (DMSO-d₆, δ) : 2.10 (3H, s), 3.10 (3H, s), 3.47 (1H, dd, J=17, 4Hz), 3.76 (1H, dd, J=17, 5Hz), 4.74 (1H, d, J=5Hz), 5.35 (1H, br s), 6.79 (1H, d, J=15Hz), 7.37 (1H, d, J=15Hz), 7.61 (1H, d, J=8Hz), 7.65 (1H, d, J=8Hz), 7.98 (1H, dd, J=8, 3Hz), 8.11 (1H, d, J=8Hz), 8.21 (1H, t, J=5Hz), 8.47 (1H, s)

35 (3) 3-[N-[(E)-3-(6-Acetamidopyridin-3-yl)acryloylglycyl]-N-methylamino]-2,6-dichlorobenzyl bromide was obtained

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according to a similar manner to that of Preparation 18-(8).

mp : 222-223°C

NMR (CDCl₃-CD₃OD, δ) : 2.22 (3H, s), 3.27 (3H, s),
3.60 (1H, dd, J=17, 3Hz), 3.94 (1H, dd, J=17, 3Hz),
4.78 (2H, s), 6.49 (1H, d, J=15Hz), 7.31 (1H, d,
J=8Hz), 7.49 (1H, d, J=8Hz), 7.51 (1H, d, J=15Hz),
7.88 (1H, dd, J=8, 3Hz), 8.23 (1H, br d, J=8Hz),
8.33 (1H, d, J=3Hz)

10 Preparation 20

(1) To a solution of 4-hydroxybenzaldehyde (10 g) and potassium carbonate (17 g) in dimethylformamide (100 ml) was added ethyl bromoacetate (15 g) under ice-cooling, and the mixture was stirred for 2 hours at ambient temperature.

15 Water was added thereto, and the mixture was extracted with ethyl acetate. The extract was washed with water and brine, dried over magnesium sulfate and concentrated. The residue was purified by flash chromatography (ethyl acetate:n-hexane, 1:4, V/V) to give 4-(ethoxycarbonylmethoxy)benzaldehyde (16 g).

20 mp : 39°C

NMR (CDCl₃, δ) : 1.32 (3H, t, J=7.5Hz), 4.28 (2H, q, J=7.5Hz), 4.71 (2H, s), 6.98 (2H, d, J=9Hz), 7.83 (2H, d, J=9Hz), 9.88 (1H, s)

25 (2) 4-(Ethoxycarbonylmethoxy)cinnamic acid was obtained according to a similar manner to that of Preparation 4.

mp : 154.2°C

30 NMR (CDCl₃, δ) : 1.30 (3H, t, J=7.5Hz), 4.28 (2H, q, J=7.5Hz), 4.66 (2H, s), 6.34 (1H, d, J=15Hz), 6.91 (2H, d, J=9Hz), 7.50 (2H, d, J=9Hz), 7.73 (1H, d, J=15Hz)

35 Preparation 21

4-Acetamidocinnamic acid (80 mg) was suspended in

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methanol (5 ml) and 10% palladium on carbon (15 mg) was added thereto. The mixture was stirred under hydrogen atmosphere at 25°C for 3 hours. Catalyst was removed and the solution was concentrated to give 3-(4-acetamidophenyl)propionic acid (69 mg) as a solid.

mp : 127.1-137.8°C

NMR (DMSO-d₆, δ) : 2.00 (3H, s), 2.47 (2H, t, J=7.5Hz), 2.74 (2H, t, J=7.5Hz), 7.12 (2H, d, J=8Hz), 7.45 (2H, d, J=8Hz), 9.85 (1H, s)

Preparation 22

The following compounds were obtained according to a similar manner to that of Preparation 21.

(1) 3-[4-(Methylcarbamoyl)phenyl]propionic acid

mp : 171.2°C

NMR (DMSO-d₆, δ) : 2.63 (2H, t, J=7.5Hz), 2.76 (3H, d, J=5Hz), 2.85 (2H, t, J=7.5Hz), 7.30 (2H, d, J=8Hz), 7.73 (2H, d, J=8Hz), 8.35 (1H, q-like)

(2) 4-[2-(Methoxycarbonyl)ethyl]benzoic acid

NMR (DMSO-d₆, δ) : 2.67 (2H, t, J=7.5Hz), 2.93 (2H, t, J=7.5Hz), 3.59 (3H, s), 7.35 (1H, d, J=8Hz), 7.85 (1H, d, J=8Hz)

(3) 3-[6-Acetamidopyridin-3-yl]propionic acid

NMR (DMSO-d₆, δ) : 2.06 (3H, s), 2.49 (2H, t, J=7.5Hz), 2.76 (2H, t, J=7.5Hz), 7.63 (1H, dd, J=2, 8Hz), 7.96 (1H, d, J=8Hz), 8.15 (1H, d, J=8Hz)

Preparation 23

(1) Methyl 3-[4-(2-pyridylmethylcarbamoyl)phenyl]propionate was obtained from 4-[2-(methoxycarbonyl)ethyl]benzoic acid and 2-pyridylmethylamine according to a similar manner to that of Example 7.

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5 NMR (CDCl₃, δ) : 2.65 (2H, t, J=7.5Hz), 3.00 (2H, t, J=7.5Hz), 3.67 (3H, s), 4.76 (2H, d, J=5Hz), 7.22 (1H, dd, J=5, 8Hz), 7.25-7.36 (3H, m), 7.55 (1H, brpeak) 7.68 (1H, td, J=8, 2Hz), 7.80 (2H, d, J=8Hz), 8.57 (1H, d, J=5Hz)

10 (2) 3-[4-(2-Pyridylmethylcarbamoyl)phenyl]propionic acid was obtained according to a similar manner to that of Preparation 3.

mp : 83.8°C

15 NMR (DMSO-d₆, δ) : 2.57 (2H, t, J=7.5Hz), 2.88 (2H, t, J=7.5Hz), 4.56 (2H, d, J=5Hz), 7.25 (1H, dd, J=5, 8Hz), 7.28-7.37 (3H, m), 7.74 (1H, td, J=8, 2Hz), 7.83 (2H, d, J=8Hz), 8.50 (1H, d, J=5Hz), 9.05 (1H, t, J=5Hz)

Preparation 24

20 To a suspension of (E)-3-(6-acetylaminopyridin-3-yl)-acrylic acid (460 mg) in ethanol (5.4 ml) was added 1N sodium hydroxide (5.4 ml) at ambient temperature, and the mixture was stirred for 3 hours at 50°C. The reaction mixture was adjusted to pH 7, and the resulting precipitate was collected by filtration and dried to give (E)-(6-aminopyridin-3-yl)acrylic acid (295 mg).

25 mp : 243.6-246.4°C

NMR (DMSO-d₆, δ) : 6.21 (1H, d, J=15Hz), 6.45 (1H, d, J=8Hz), 6.52 (2H, s), 7.42 (1H, d, J=15Hz), 7.75 (1H, d, J=8Hz), 8.11 (1H, s)

30 Preparation 25

(1) To a suspension of 4-amino-N-methylbenzamide (500 mg) in tetrahydrofuran (5 ml) was added di-tert-butyl dicarbonate (799 mg) and the mixture was stirred for 18 hours at 50°C. The mixture was concentrated and the residue was dissolved in
35 ethyl acetate. The solution was stirred under ice-cooling,

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and the resulting precipitates were collected by filtration to give N-(tert-butoxycarbonyl)-4-methylcarbamoylaniline (500 mg).

mp : 185.2°C

5 NMR (CDCl₃, δ) : 1.54 (9H, s), 3.00 (3H, d, J=6Hz),
6.12 (1H, br s), 6.69 (1H, br s), 7.43 (2H, d,
J=9Hz), 7.70 (2H, d, J=9Hz)

10 (2) Sodium hydride (60% dispersion in mineral oil, 41.9 mg)
was added to a solution of N-(tert-butoxycarbonyl)-4-
methylcarbamoylaniline (250 mg) in dimethylformamide (2.5 ml)
in ice water bath under nitrogen and stirred for 30 minutes
under same condition. To the mixture was added tert-
15 butylbromoacetate (234 mg) and stirred at ambient temperature
for 20 hours. The reaction mixture was poured into water and
extracted with chloroform. The organic layer was separated,
washed with brine, dried over magnesium sulfate and
evaporated in vacuo. The residue was recrystallized from
ethyl acetate - n-hexane to give N-(tert-butoxycarbonyl)-N-
20 (tert-butoxycarbonylmethyl)-4-methylcarbamoylaniline (280
mg).

mp : 163.7-165.9°C

25 NMR (CDCl₃, δ) : 1.46 (9H, s), 1.49 (9H, s), 3.00 (3H,
d, J=5Hz), 4.19 (2H, s), 6.11 (1H, br q, J=5Hz),
7.33 (2H, br q, J=9Hz), 7.71 (2H, d, J=9Hz)

30 (3) Trifluoroacetic acid (3.3 ml) was added to a solution of
N-(tert-butoxycarbonyl)-N-(tert-butoxycarbonylmethyl)-4-
methylcarbamoylaniline (250 mg) in ice water bath and stirred
for 20 hours at ambient temperature. The solvent was
evaporated under reduced pressure. The residue was
pulverized with diethyl ether to give N-(4-
methylcarbamoylphenyl)glycine (125 mg).

mp : 233.5°C

35 NMR (DMSO-d₆, δ) : 2.72 (3H, d, J=5Hz), 3.85 (3H, s),

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6.55 (2H, d, J=9Hz), 7.60 (2H, d, J=9Hz), 7.99 (1H, br q, J=5Hz)

Preparation 26

5 To a mixture of naphthalene-2,6-dicarboxylic acid (5 g), methylamine hydrochloride (1.64 g) and 1-hydroxybenzotriazole (3.75 g) in dimethylformamide (50 ml) was added 1-ethyl-3-(3-dimethylaminopropyl)carbodiimide (3.79 g) under ice-cooling. The mixture was stirred for 1 hour at the same temperature and then at ambient temperature overnight. The mixture was
10 diluted with water, and the precipitates were collected by filtration to give 6-(methylcarbamoyl)naphthalene-2-carboxylic acid (4.07 g).

mp : >275.7°C

15 NMR (DMSO-d₆, δ) : 2.82 (3H, d, J=5Hz), 7.90-8.14 (3H, m), 8.20 (1H, d, J=7.5Hz), 8.45 (1H, br d, J=7.5Hz), 8.58-8.74 (2H, m)

Preparation 27

20 (1) To a mixture of 2,4-dichlorophenol (3.20 g) and imidazole (2.67 g) in dimethylformamide (30 ml) was added triisopropylsilyl chloride (3.97 g) in water bath under nitrogen atmosphere, and the mixture was stirred for 3 hours under the same condition. The mixture was poured into water
25 and extracted with ethyl acetate. The organic layer was washed with water and brine, dried over magnesium sulfate and concentrated in vacuo. The residue was purified by silica gel column chromatography (n-hexane) to give 1,3-dichloro-4-triisopropylsilyloxybenzene (5.12 g).

30 NMR (CDCl₃, δ) : 1.12 (18H, d, J=7.5Hz), 1.23-1.39 (3H, m), 6.83 (1H, d, J=8Hz), 7.06 (1H, d, J=8Hz), 7.34 (1H, d, J=2Hz)

(2) To a solution of 1,3-dichloro-4-
35 triisopropylsilyloxybenzene (6.00 g) in tetrahydrofuran (50

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ml) at -60°C was added dropwise n-butyllithium, 1.6M solution of hexane (12.9 ml) over 30 minutes under nitrogen and the mixture was stirred for 1 hour at the same temperature. A solution of ethyl chloroformate in tetrahydrofuran (20 ml) was added dropwise to the mixture over 20 minutes at -60°C . The resulting mixture is stirred for 1 hour at -60°C , the cooling bath was removed, and temperature was allowed to rise to 20°C . A solution of ammonium chloride (2 g) in water (37 ml) was then added over 5 minutes followed by ethyl acetate (40 ml) and brine (40 ml). The organic layer was separated, washed with water and brine, dried over magnesium sulfate and evaporated in vacuo. The residue was chromatographed on silica gel eluting with a mixture of ethyl acetate and hexane (1:10 to 1:6) to give ethyl 2,6-dichloro-3-triisopropylsilyloxybenzoate (1.59 g) as an oil.

NMR (CDCl_3 , δ) : 1.12 (18H, d, $J=7.5\text{Hz}$), 1.23-1.38 (3H, m), 1.41 (3H, t, $J=7.5\text{Hz}$), 4.46 (2H, q, $J=7.5\text{Hz}$), 6.85 (1H, d, $J=8\text{Hz}$), 7.15 (1H, d, $J=8\text{Hz}$)

(3) Ethyl 2,6-dichloro-3-hydroxybenzoate was obtained according to a similar manner to that of Preparation 18-(7).

NMR (CDCl_3 , δ) : 1.42 (3H, t, $J=7.5\text{Hz}$), 4.45 (2H, q, $J=7.5\text{Hz}$), 7.01 (1H, d, $J=8\text{Hz}$), 7.23 (1H, d, $J=8\text{Hz}$)

(4) To a suspension of sodium hydride (60% in oil, 474 mg) in N,N-dimethylformamide (2 ml) was added a solution of ethyl 2,6-dichloro-3-hydroxybenzoate (2.42 g) in N,N-dimethylformamide (10 ml) under nitrogen at ambient temperature and the mixture was stirred for 1 hour at the same temperature. Chloromethyl methyl ether (1.15 ml) was added thereto and the mixture was stirred for 1 hour at the same temperature. The reaction mixture was poured into water and extracted with ethyl acetate. The organic layer was washed with water and brine, dried over magnesium sulfate and evaporated in vacuo. The residue was chromatographed on

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silica gel eluting with a mixture of ethyl acetate and hexane (1:8, V/V) to give ethyl 2,6-dichloro-3-(methoxymethoxy)benzoate (2.58 g) as an oil.

5 NMR (CDCl₃, δ) : 1.42 (3H, t, J=7.5Hz), 3.50 (3H, s), 4.46 (2H, q, J=7.5Hz), 5.23 (2H, s), 7.16 (1H, d, J=8Hz), 7.25 (1H, d, J=8Hz)

10 (5) To a suspension of lithium aluminum hydride (347 mg) in tetrahydrofuran was dropwise added a solution of ethyl 2,6-dichloro-3-(methoxymethoxy)benzoate (2.55 g) in tetrahydrofuran at 0°C under nitrogen atmosphere, and the mixture was stirred for 30 minutes at the same temperature and for 18 hours at ambient temperature. Water was dropwise added thereto at 0°C, and the mixture was extracted with 15 ethyl acetate. The organic layer was washed with water and brine, dried over magnesium sulfate and evaporated in vacuo. The residue was purified by flash chromatography (n-hexane:ethyl acetate = 6:1, V/V) to give 2,6-dichloro-3-(methoxymethoxy)benzyl alcohol.

20 NMR (CDCl₃, δ) : 2.14 (1H, t, J=7.5Hz), 3.51 (3H, s), 4.47 (2H, d, J=7.5Hz), 5.23 (2H, s), 7.11 (1H, d, J=8Hz), 7.26 (1H, d, J=8Hz)

25 (6) To a solution of 2,6-dichloro-3-(methoxymethoxy)benzyl alcohol (1.1 g) and triethylamine (563 mg) in dichloromethane was added a solution of methanesulfonyl chloride (585 mg) in dichloromethane at -20°C over 5 minutes under nitrogen atmosphere, and the mixture was stirred at the same temperature for 30 minutes and under ice-cooling for 30 30 minutes. The reaction mixture was washed with saturated sodium bicarbonate solution and brine, dried over magnesium sulfate and evaporated in vacuo to give 1,3-dichloro-2-methanesulfonyloxymethyl-4-(methoxymethoxy)benzene.

35 NMR (CDCl₃, δ) : 3.10 (3H, s), 3.52 (3H, s), 5.25 (2H, s), 5.53 (2H, s), 7.23 (1H, d, J=8Hz), 7.32 (1H, d,

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J=8Hz)

Preparation 28

5 (1) To a suspension of (E)-3-(6-acetylaminopyridin-3-yl)acrylic acid (200 mg) in a mixture of dichloromethane (3 ml) and methanol (3 ml) was added a solution of 10% trimethylsilyldiazomethane (3 ml) at ambient temperature and the mixture was stirred for 3 hours. The reaction mixture was evaporated in vacuo, poured into water and extracted with dichloromethane. The organic layer was washed with water and brine, dried over magnesium sulfate and evaporated in vacuo. The residue was collected by vacuum filtration and washed with diisopropyl ether to give methyl (E)-3-(6-acetylaminopyridin-3-yl)acrylate (197 mg) as a powder.

15 mp : 171.5-200°C

NMR (CDCl₃, δ) : 2.22 (3H, s), 3.80 (3H, s), 6.41 (1H, d, J=16Hz), 7.64 (1H, d, J=16Hz), 7.89 (1H, dd, J=2, 8Hz), 8.07 (1H, br s), 8.25 (1H, d, J=8Hz), 8.38 (1H, d, J=2Hz)

20 (2) To a suspension of sodium hydride (60% in oil, 20.6 mg) in N,N-dimethylformamide (1 ml) was added dropwise a solution of methyl (E)-3-(6-acetylaminopyridin-3-yl)acrylate (180 mg) in N,N-dimethylformamide (2 ml) at 0°C under nitrogen and the mixture was stirred for 1 hour. Methyl iodide (116 mg) was added to the mixture under the same condition and the mixture was stirred for 2 hours. The reaction mixture was poured into water and extracted with ethyl acetate. The organic layer was washed with water and brine, dried over magnesium sulfate and evaporated in vacuo. The residue was collected by vacuum filtration and washed with diisopropyl ether to give methyl (E)-3-[6-(N-methyl-N-acetyl amino)pyridin-3-yl]acrylate (115 mg) as a powder.

30 mp : 94.3°C

35 NMR (CDCl₃, δ) : 2.20 (3H, s), 3.44 (3H, s), 3.82 (3H,

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s), 6.48 (1H, d, J=16Hz), 7.48 (1H, br d, J=8Hz), 7.67 (1H, d, J=16Hz), 7.87 (1H, dd, J=2, 8Hz), 8.56 (1H, d, J=2Hz)

5 (3) To a solution of methyl (E)-3-[6-(N-methyl-N-acetylamino)pyridin-3-yl]acrylate (110 mg) in methanol (3 ml) was added 1N sodium hydroxide solution (1.1 ml) at ambient temperature and the mixture was stirred at 50°C for 4 hours. The reaction mixture was evaporated in vacuo and was
10 dissolved in water. The solution was adjusted to pH 6 with 1N hydrochloric acid, and the precipitate was collected by vacuum filtration to give (E)-3-[6-(methylamino)pyridin-3-yl]acrylic acid (72 mg) as a powder.

mp : 227°C

15 NMR (CDCl₃, δ) : 2.80 (1H, d, J=5Hz), 6.23 (1H, d, J=16Hz), 6.47 (1H, d, J=8Hz), 7.09 (1H, q, J=5Hz), 7.45 (1H, d, J=16Hz), 7.76 (1H, dd, J=2, 8Hz), 8.20 (1H, d, J=2Hz)

20 Preparation 29

(1) To a solution of 2-methylnicotinic acid (470 mg) in dichloromethane (6 ml) were dropwise added oxalyl chloride (522 mg) and dimethylformamide (1 drop) at 0°C under nitrogen atmosphere, and the mixture was stirred for 1 hour at the
25 same condition. The mixture was concentrated and the residue was pulverized with diethyl ether to give 2-methylnicotinoyl chloride hydrochloride (671 mg) as a solid.

NMR (CDCl₃, δ) : 3.23 (3H, s), 7.96 (1H, dd, J=6, 8Hz), 8.93 (1H, d, J=6Hz), 9.08 (1H, d, J=8Hz)

30 (2) To a mixture of 10% trimethylsilyldiazomethane in hexane (4.2 ml) and triethylamine (527 mg) in tetrahydrofuran-acetonitrile (1:1, 10 ml) was added dropwise 2-methylnicotinoyl chloride hydrochloride (500 mg) in an ice
35 water bath. The mixture was stirred for 7 hours in an ice

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water bath and allowed to stand for 18 hours at 0°C, then evaporated in vacuo. Saturated aqueous sodium bicarbonate solution was added to the residue and the mixture was extracted with ethyl acetate. The organic layer was washed with water and brine, and dried over magnesium sulfate. Evaporation of the solvent gave crude 3-diazoacetyl-2-methylpyridine as a yellow oil.

Benzyl alcohol (2 ml) and 2,4,6-trimethylpyridine (2 ml) were added to the residue. The mixture was stirred at 180°C-185°C for 20 minutes. The reaction mixture was poured into water and extracted with ethyl acetate. The organic layer was washed with water and brine, and dried over magnesium sulfate. The solvent, 2,4,6-trimethylpyridine and excess benzyl alcohol were evaporated in vacuo to give crude benzyl 2-(2-methyl-3-pyridyl)acetate as an oil.

NMR (CDCl₃, δ) : 2.50 (3H, s), 3.67 (2H, s), 5.14 (2H, s), 7.10 (1H, dd, J=8, 6Hz), 7.23-7.40 (5H, m), 7.49 (1H, dd, J=8, 2Hz), 8.49 (1H, dd, J=6, 2Hz)

(3) The residue including benzyl 2-(2-methyl-3-pyridyl)acetate obtained in Preparation 29-(2) was dissolved in methanol (5 ml), and 10% palladium on carbon was added thereto. The mixture was stirred under hydrogen atmosphere for 3 hours. The reaction mixture was diluted with water and washed with ethyl acetate. The solvent was removed in vacuo to give 2-(2-methyl-3-pyridyl)acetic acid (90 mg).

NMR (DMSO-d₆, δ) : 2.40 (3H, s), 3.62 (2H, s), 7.15 (1H, dd, J=6, 8Hz), 7.55 (1H, d, J=8Hz), 8.30 (1H, d, J=6Hz)

Preparation 30

(1) 6-Methylnicotinoyl chloride hydrochloride was obtained by reacting 6-methyl nicotinic acid with oxalyl chloride according to a similar manner to that of Preparation 29-(1).

NMR (CDCl₃, δ) : 3.13 (3H, s), 7.84 (1H, d, J=8Hz),

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8.82 (1H, dd, J=2, 8Hz), 9.35 (1H, d, J=2Hz)

5 (2) Benzyl 2-(6-methyl-3-pyridyl)acetate was obtained according to a similar manner to that of Preparation 29-(2).

NMR (CDCl₃, δ) : 2.54 (3H, s), 3.63 (2H, s), 5.14 (2H, s), 7.12 (1H, d, J=8Hz), 7.19-7.46 (5H, m), 7.53 (1H, dd, J=8, 2Hz), 8.40 (1H, d, J=2Hz)

10 (3) 2-(6-Methyl-3-pyridyl)acetic acid was obtained according to a similar manner to that of Preparation 29-(3).

NMR (DMSO-d₆, δ) : 2.43 (3H, s), 3.56 (2H, s), 7.20 (1H, d, J=8Hz), 7.55 (1H, dd, J=2, 8Hz), 8.30 (1H, d, J=2Hz)

15

Preparation 31

(1) 2-(tert-Butoxycarbonylamino)benzothiazole was obtained by reacting 2-aminobenzothiazole with di-tert-butyl dicarbonate according to a similar manner to that of Preparation 25-(1).

20

NMR (CDCl₃, δ) : 1.59 (9H, s), 7.22-7.30 (1H, m), 7.40 (1H, t, J=8Hz), 7.79 (8H, d), 7.85 (8H, d)

25 (2) 2-(N-tert-Butoxycarbonyl-N-tert-butoxycarbonylmethylamino)benzothiazole was obtained according to a similar manner to that of Preparation 25-(2).

30 NMR (CDCl₃, δ) : 1.46 (9H, s), 1.57 (9H, s), 4.86 (2H, s), 7.24 (1H, t, J=8Hz), 8.38 (1H, t, J=8Hz), 7.71-7.78 (2H, m)

(3) 2-(Carboxymethylamino)benzothiazole was obtained according to a similar manner to that of Preparation 25-(3).

35 NMR (DMSO-d₆, δ) : 4.10 (2H, d, J=6Hz), 7.04 (1H, t,

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J=8Hz), 7.22 (1H, t, J=8Hz), 7.40 (1H, d, J=8Hz),
7.68 (1H, d, J=8Hz), 8.32 (1H, t, J=6Hz)

Preparation 32

- 5 (1) A mixture of p-toluidine (10 g) and diethyl 2-methyl-3-oxosuccinate (18.9 g) in dichloromethane (50 ml) was refluxed for 2 days. The reaction mixture was poured into 0.5N hydrochloric acid (200 ml) and extracted with dichloromethane. The organic layer was washed with water,
10 0.5N sodium hydroxide solution and brine, dried over magnesium sulfate, and concentrated. The obtained residue was added to heated diphenyl (80 g) and the mixture was refluxed for 15 minutes. The reaction mixture was allowed to stand at ambient temperature, and the resulting precipitates
15 were collected by filtration to give ethyl 1,4-dihydro-3,6-dimethyl-4-oxoquinoline-2-carboxylate (16.3 g).

mp : 190.1-192.7°C

NMR (CDCl₃, δ) : 1.47 (3H, t, J=7Hz), 2.15 (3H, s),
2.47 (3H, s), 4.51 (2H, q, J=7Hz), 7.30 (1H, d,
20 J=8Hz), 7.45 (1H, dd, J=2, 8Hz), 8.13 (1H, s-like),
9.20 (1H, br s)

- (2) To a mixture of ethyl 1,4-dihydro-3,6-dimethyl-4-oxoquinoline-2-carboxylate (4.0 g) and phosphoryl chloride
25 (10 g) was added N,N-dimethylaniline (3.95 g) at ambient temperature and the mixture was stirred for 1 hour. The solvent was removed in vacuo, and the residue was poured into ice-water and extracted with ethyl acetate. The organic
30 layer was washed with water, saturated sodium bicarbonate solution and brine, dried over magnesium sulfate and concentrated in vacuo. The residue was purified by flash chromatography (n-hexane-dichloromethane) to give ethyl 4-chloro-3,6-dimethylquinoline-2-carboxylate (3.17 g) as an oil.

35 NMR (CDCl₃, δ) : 1.49 (3H, t, J=7Hz), 2.61 (3H, s),

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2.68 (3H, s), 4.55 (2H, q, J=7Hz), 7.59 (1H, d, J=8Hz), 8.00 (1H, s-like), 8.06 (1H, dd, J=2, 8Hz)

5 (3) A mixture of ethyl 4-chloro-3,6-dimethylquinoline-2-carboxylate (3.0 g), triethylamine (2.4 ml) and 10% palladium on carbon (300 mg) in ethyl acetate (30 ml) was stirred for 4 hour at ambient temperature under hydrogen atmosphere. After filtration the filtrate was concentrated in vacuo and diluted with dichloromethane. The mixture was washed with saturated sodium bicarbonate solution and water, dried over magnesium sulfate and concentrated in vacuo. The residue was purified by flash chromatography (dichloromethane-ethyl acetate) to give ethyl 3,6-dimethylquinoline-2-carboxylate.

10 NMR (CDCl₃, δ) : 1.47 (3H, t, J=7Hz), 2.55 (3H, s), 2.66 (3H, s), 4.53 (2H, q, J=7Hz), 7.49-7.55 (2H, m), 7.92 (1H, s), 8.06 (1H, d, J=8Hz)

20 (4) To a solution of ethyl 3,6-dimethylquinoline-2-carboxylate (1.0 g) in tetrachloromethane (10 ml) were added N-bromosuccinimide (815 mg) and 2,2'-azobis(2,4-dimethyl-4-methoxyvaleronitrile) at ambient temperature under nitrogen atmosphere, and the mixture was heated at 90°C for 1 hour. The reaction mixture was poured into 5% sodium thiosulfate solution and extracted with dichloromethane. The organic layer was washed with water, dried over magnesium sulfate, and concentrated in vacuo. The residue was purified by flash chromatography (n-hexane - ethyl acetate) to give ethyl 6-bromomethyl-3-methylquinoline-2-carboxylate (802 mg) as a solid.

25 NMR (CDCl₃, δ) : 1.49 (3H, t, J=7.5Hz), 2.66 (3H, s), 4.54 (2H, q, J=7.5Hz), 4.65 (3H, s), 7.71 (1H, d, J=8Hz), 7.77 (1H, d, J=2Hz), 8.00 (1H, s-like), 8.16 (1H, d, J=8Hz)

35 (5) To a solution of ethyl 6-bromomethyl-3-methylquinoline-

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2-carboxylate (700 mg) in dimethylformamide (7 ml) was added sodium acetate (373 mg) at ambient temperature, and the mixture was stirred for 24 hours at the same temperature. The reaction mixture was poured into water and extracted with ethyl acetate. The organic layer was washed with water, sodium bicarbonate solution and brine, dried over magnesium sulfate, and concentrated in vacuo. The residue was purified by preparative thin-layer chromatography (n-hexane:ethyl acetate = 1:2, V/V) to give ethyl 6-acetoxymethyl-3-methylquinoline-2-carboxylate (452 mg) as an oil.

NMR (CDCl₃, δ) : 1.48 (3H, t, J=7.5Hz), 2.15 (3H, s), 2.67 (3H, s), 4.53 (2H, q, J=7.5Hz), 5.29 (2H, s), 7.66 (1H, dd, J=2, 8Hz), 7.75 (1H, s-like), 8.01 (1H, s-like), 8.18 (1H, d, J=8Hz)

(6) A mixture of ethyl 6-acetoxymethyl-3-methylquinoline-2-carboxylate (420 mg) and potassium carbonate in methanol was stirred for 30 minutes under ice-cooling. After filtration the filtrate was concentrated and partitioned between ethyl acetate and water. The organic layer was washed with water, dried over magnesium sulfate and concentrated to give methyl 6-hydroxymethyl-3-methylquinoline-2-carboxylate (20 mg).

mp : 84.3°C

NMR (CDCl₃, δ) : 2.70 (3H, s), 4.05 (3H, s), 4.90 (2H, s), 7.68 (1H, dd, J=2, 8Hz), 7.76 (1H, s-like), 8.01 (1H, s-like), 8.17 (1H, d, J=8Hz)

(7) To a mixture of methyl 6-hydroxymethyl-3-methylquinoline-2-carboxylate (193 mg), triethylamine (422 mg) dimethyl sulfoxide (2 ml) and dichloromethane (2 ml) was added portionwise sulfur trioxide pyridine complex (266 mg) in water bath and the mixture was stirred for 2 hours at the same temperature. The reaction mixture was poured into water and extracted with ethyl acetate. The organic layer was washed with water and brine, dried over magnesium sulfate and

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evaporated in vacuo. The residue was purified by preparative thin-layer chromatography (n-hexane:ethyl acetate = 1:1, V/V) to give methyl 6-formyl-3-methylquinoline-2-carboxylate (149 mg).

5 mp : 117.8-120.7°C
NMR (CDCl₃, δ) : 2.71 (3H, s), 4.08 (3H, s), 8.15-8.28 (2H, m), 8.28-8.35 (2H, m), 10.20 (1H, s)

10 (8) To a mixture of water (0.8 ml) and tert-butyl alcohol (3 ml) were added methyl 6-formyl-3-methylquinoline-2-carboxylate (140 mg), 2-methyl-2-butene (190 mg) and sodium dihydrogenphosphate (105 mg) in water bath. To the mixture was added dropwise sodium chlorite (244 mg) and the mixture was stirred for 1 hour at the same temperature. The reaction
15 mixture was cooled in an ice bath, adjusted to pH 4 with 1M hydrochloric acid and extracted with dichloromethane. The organic layer was dried over magnesium sulfate and evaporated in vacuo. The residue was purified by preparative thin-layer chromatography (dichloromethane:methanol = 10:1, V/V)
20 followed by crystallization from methanol-isopropyl ether to give 2-methoxycarbonyl-3-methylquinoline-6-carboxylic acid (121 mg) as crystals.

mp : 215°C
25 NMR (CDCl₃, δ) : 2.57 (3H, s), 3.96 (3H, s), 8.11 (1H, dd, J=2, 8Hz), 8.21 (1H, dd, J=2, 8Hz), 8.53 (1H, d, J=2Hz), 8.62 (1H, d, J=2Hz)

Example 1

30 To a mixture of 8-[3-(N-glycyl-N-methylamino)-2,6-dichlorobenzyloxy]-2-methylquinoline (1.65 g), (E)-3-(6-ethoxycarbonyl-3-pyridyl)acrylic acid (1.04 g) and dimethylformamide (25 ml) were added 1-ethyl-3-(3-dimethylaminopropyl)carbodiimide hydrochloride (939 mg) and
35 1-hydroxybenzotriazole (717 mg). After being stirred for 4 hours at ambient temperature, the mixture was poured into

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water and extracted with ethyl acetate. The organic layer was separated, washed with water, dried over magnesium sulfate and evaporated in vacuo. The residue was purified by silica gel column chromatography (dichloromethane - methanol) to give 8-[2,6-dichloro-3-[N-[(E)-3-(6-ethoxycarbonylpyridin-3-yl)acryloyl]glycyl]-N-methylamino]benzyloxy]-2-methylquinoline (2.07 g) as an amorphous powder.

NMR (CDCl₃, δ) : 1.45 (3H, t, J=7.5Hz), 2.72 (3H, s), 3.27 (3H, s), 3.70 (1H, dd, J=18, 4Hz), 3.94 (1H, dd, J=18, 4Hz), 4.49 (2H, q, J=7.5Hz), 5.59-5.70 (2H, m), 6.66 (1H, d, J=16Hz), 6.80 (1H, t-like), 7.22-7.35 (3H, m), 7.37-7.53 (3H, m), 7.60 (1H, d, J=16Hz), 7.88-7.94 (1H, m), 8.02 (1H, d, J=8Hz), 8.12 (1H, d, J=8Hz), 8.81-8.86 (1H, m)

Example 2

The following compounds were obtained according to a similar manner to that of Example 1.

(1) 8-[3-[N-[(E)-3-(6-Aminopyridin-3-yl)acryloyl]glycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline

NMR (CDCl₃, δ) : 2.73 (3H, s), 3.27 (3H, s), 3.65 (1H, dd, J=17, 4Hz), 3.94 (1H, dd, J=17, 5Hz), 4.75 (2H, s), 5.64 (2H, s), 5.84 (1H, d, J=10Hz), 6.30 (1H, d, J=15Hz), 6.48 (1H, d, J=8.5Hz), 6.62 (1H, br t, J=4Hz), 7.23-7.35 (3H), 7.39-7.52 (4H), 7.60 (1H, dd, J=8.5, 1.5Hz), 8.02 (1H, d, J=8.5Hz), 8.16 (1H, d, J=1.5Hz)

(2) 8-[2,6-Dichloro-3-[N-[4-(methoxycarbonyl)cinnamoyl]glycyl]-N-methylamino]benzyloxy]-2-methylquinoline

NMR (CDCl₃, δ) : 2.74 (3H, s), 3.27 (3H, s), 3.64 (1H, dd, J=18, 4Hz), 3.87-4.00 (4H, m), 5.60-5.70 (2H, m), 6.57 (1H, d, J=16Hz), 6.75 (1H, t-like), 7.24-7.63 (11H, m), 7.99-8.05 (1H, m)

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- (3) 8-[2,6-Dichloro-3-[N-[4-(ethoxycarbonylmethoxy)-cinnamoylglycyl]-N-methylamino]benzyloxy]-2-methylquinoline

5 NMR (CDCl₃, δ) : 1.31 (3H, t, J=7.5Hz), 2.75 (3H, s),
3.26 (3H, s), 3.65 (1H, dd, J=18, 4Hz), 3.95 (1H,
dd, J=18, 5Hz), 4.29 (2H, q, J=7.5Hz), 4.64 (2H,
s), 5.64 (1H, d, J=9Hz), 5.67 (1H, d, J=9Hz), 6.35
10 (1H, d, J=15Hz), 6.57 (1H, br t, J=5Hz), 6.85-6.93
(2H, m), 7.21-7.34 (3H, m), 7.37-7.58 (6H, m), 8.03
(1H, d, J=8Hz)

- (4) 8-[3-[N-[3-(4-Acetamidophenyl)propionylglycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline

15 NMR (CDCl₃, δ) : 2.04 (3H, s), 2.51 (2H, t, J=7.5Hz),
2.68 (3H, s), 2.88 (2H, t, J=7.5Hz), 3.21 (3H, s),
3.44 (1H, dd, J=4, 18Hz), 3.70 (1H, dd, J=5, 18Hz),
5.59 (2H, s-like), 6.38 (1H, t-like), 7.06 (2H, d,
J=8Hz), 7.13 (1H, d, J=8Hz), 7.21-7.34 (3H, m),
20 7.34-7.49 (4H, m), 8.04 (1H, d, J=8Hz), 8.15 (1H,
s)

its hydrochloride

25 NMR (DMSO-d₆, δ) : 2.01 (3H, s), 2.39 (2H, t, J=7.5Hz),
2.70 (2H, t, J=7.5Hz), 2.90 (3H, s), 3.12 (3H, s),
3.41 (1H, dd, J=5, 18Hz), 3.73 (1H, dd, J=5, 18Hz),
5.60 (1H, d, J=10Hz), 5.66 (1H, d, J=10Hz), 7.08
(2H, d, J=8Hz), 7.44 (2H, d, J=8Hz), 7.76-7.99 (6H,
m), 8.10 (1H, t, J=8Hz), 8.98 (1H, br peak)

- 30 (5) 8-[2,6-Dichloro-3-[N-methyl-N-[3-[4-(methylcarbamoyl)-phenyl]propionylglycyl]amino]benzyloxy]-2-methylquinoline

35 NMR (CDCl₃, δ) : 2.51 (2H, t, J=7.5Hz), 2.71 (3H, s),
2.93-3.01 (5H, m), 3.23 (3H, s), 3.46 (1H, dd, J=4,
18Hz), 3.78 (1H, dd, J=4, 18Hz), 5.63 (2H, s), 6.17

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(1H, q-like), 6.36 (1H, t-like), 7.20-7.33 (5H, m),
7.37-7.50 (3H, m), 7.66 (2H, d, J=8Hz), 8.03 (1H,
d, J=8Hz)

5 its hydrochloride

NMR (DMSO-d₆, δ) : 2.46 (2H, t, J=7.5Hz), 2.76 (3H, d,
J=5Hz), 2.82 (3H, t, J=7.5Hz), 2.90 (3H, s), 3.13
10 (3H, s), 3.43 (1H, dd, J=5, 16Hz), 3.73 (1H, dd,
J=5, 16Hz), 5.60 (1H, d, J=10Hz), 5.66 (1H, d,
J=10Hz), 7.26 (2H, d, J=8Hz), 7.72 (2H, d, J=8Hz),
7.77-8.01 (6H, m), 8.13 (1H, t-like), 8.38 (1H,
q-like), 8.94-9.04 (1H, m)

15 (6) 8-[2,6-Dichloro-3-[N-methyl-N-[3-[4-(2-
pyridylmethylcarbamoyl)phenyl]propionylglycyl]amino]-
benzyloxy]-2-methylquinoline

NMR (CDCl₃, δ) : 2.54 (2H, t, J=7.5Hz), 2.73 (3H, s),
3.00 (2H, t, J=7.5Hz), 3.22 (3H, s), 3.47 (1H, dd,
J=4, 17Hz), 3.79 (1H, dd, J=5, 17Hz), 4.75 (2H, d,
J=6Hz), 5.64 (2H, s), 6.38 (1H, t-like), 7.17-7.57
20 (11H, m), 7.68 (1H, td, J=8, 2Hz), 7.79 (2H, d,
J=8Hz), 8.03 (1H, d, J=8Hz), 8.56 (1H, d, J=5Hz)

25 its dihydrochloride

NMR (DMSO-d₆, δ) : 2.47 (2H, t, J=7.5Hz), 2.83 (2H, t,
J=7.5Hz), 2.90 (3H, s), 3.13 (3H, s), 3.43 (1H, dd,
J=4, 16Hz), 3.73 (1H, dd, J=4, 16Hz), 4.78 (2H, d,
J=5Hz), 5.60 (1H, d, J=10Hz), 5.65 (1H, d, J=10Hz),
7.32 (2H, d, J=8Hz), 7.75-8.00 (10H, m), 8.15 (1H,
30 t, J=5Hz), 8.40 (1H, t, J=8Hz), 8.78 (1H, d,
J=5Hz), 8.95 (1H, d-like), 9.40 (1H, t, J=5Hz)

35 (7) 8-[2,6-Dichloro-3-[N-methyl-N-[N-[4-(methylcarbamoyl)-
phenyl]glycylglycyl]amino]benzyloxy]-2-methylquinoline
mp : 280.1°C

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5 NMR (DMSO-d₆, δ) : 2.59 (3H, s), 2.74 (3H, d, J=5Hz),
3.12 (3H, s), 3.40 (1H, dd, J=17, 4Hz), 3.65 (1H,
dd, J=17, 5Hz), 3.71 (2H, d, J=6Hz), 5.46 (1H, d,
J=9Hz), 5.52 (1H, d, J=9Hz), 6.44-6.60 (3H, m),
7.32-7.69 (6H, m), 7.75 (2H, s), 7.94-8.10 (2H, m),
8.20 (1H, d, J=8Hz)

its dihydrochloride

10 NMR (CDCl₃-CD₃OD, δ) : 2.97 (3H, s), 3.04 (3H, s), 3.21
(3H, s), 3.80 (2H, s), 3.93 (1H, d, J=17Hz), 4.00
(1H, d, J=17Hz), 5.60 (1H, d, J=9Hz), 5.65 (1H, d,
J=9Hz), 6.86-6.95 (2H, d, J=9Hz), 7.45-7.68 (5H,
m), 7.70-7.90 (3H, m), 8.80 (1H, d, J=8Hz)

15 (8) 8-[2,6-Dichloro-3-[N-methyl-N-[[6-(methylcarbamoyl)-
naphthalene-2-carbonyl]glycyl]amino]benzyloxy]-2-
methylquinoline

20 NMR (CDCl₃, δ) : 2.70 (3H, s), 3.04 (3H, d, J=4.5Hz),
3.27 (3H, s), 3.75 (1H, dd, J=17, 4Hz), 4.03 (1H,
dd, J=17, 5Hz), 5.64 (2H, s), 6.59 (1H, br q,
J=4.5Hz), 7.26-7.50 (6H, m), 7.36 (1H, br t,
J=4.5Hz), 7.84-7.95 (4H, m), 8.03 (1H, d, J=8Hz),
8.31 (2H, br d, J=8Hz)

25 (9) 8-[2,6-Dichloro-3-[N-[(2-methoxycarbonyl-3-
methylquinoline-6-carbonyl)glycyl]-N-
methylamino]benzyloxy]-2-methylquinoline

30 NMR (CDCl₃, δ) : 2.70 (3H, s), 2.75 (3H, s), 3.30 (3H,
s), 3.79 (1H, dd, J=4, 18Hz), 4.01-4.11 (5H, m),
5.67 (2H, s), 7.25-7.55 (7H, m), 8.00-8.15 (3H, m),
8.24 (1H, d, J=8Hz), 8.29 (1H, d, J=2Hz)

35 (10) 8-[2,6-Dichloro-3-[N-methyl-N-[4-
(methylcarbamoyl)cinnamoylglycyl]amino]benzyloxy]-4-
methoxy-2-methylquinoline

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5 NMR (CDCl₃, δ) : 2.67 (3H, s), 3.00 (3H, d, J=5Hz),
3.26 (3H, s), 3.15 (1H, dd, J=17, 4Hz), 3.92 (1H,
dd, J=17, 5Hz), 4.02 (3H, s), 5.59 (1H, d, J=10Hz),
5.63 (1H, d, J=10Hz), 6.38 (1H, br d, J=5Hz), 6.52
(1H, d, J=15Hz), 6.65 (1H, s), 6.76 (1H, br s),
7.21-7.31 (2H, m), 7.38 (1H, t, J=8Hz), 7.43-7.61
(4H, m), 7.75 (2H, d, J=8Hz), 7.83 (1H, d, J=8Hz)

its hydrochloride

10 NMR (CDCl₃-CD₃OD, δ) : 2.99 (3H, s), 3.00 (3H, br s),
3.29 (3H, s), 3.89 (1H, d, J=17Hz), 4.10 (1H, d,
J=17Hz), 4.36 (3H, s), 5.51 (1H, d, J=10Hz), 5.68
(1H, d, J=10Hz), 6.63 (1H, d, J=15Hz), 7.35-7.43
15 (2H, m), 7.48-7.59 (6H, m), 7.70-7.81 (4H, m), 7.95
(1H, d, J=8Hz)

(11) 8-[3-[N-[(E)-3-(6-Acetylamino-3-pyridin-3-yl)acryloyl]glycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-4-methoxy-2-methylquinoline

20 NMR (CDCl₃, δ) : 2.21 (3H, s), 2.69 (3H, s), 3.27 (3H,
s), 3.67 (1H, dd, J=17, 4Hz), 3.94 (1H, dd, J=17,
5Hz), 4.01 (3H, s), 5.59 (1H, d, J=10Hz), 5.64 (1H,
d, J=10Hz), 6.48 (1H, d, J=15Hz), 6.65 (1H, s),
6.74 (1H, br t, J=5Hz), 7.23 (1H, d, J=8Hz), 7.30
25 (1H, d, J=8Hz), 7.38 (1H, t, J=8Hz), 7.48 (1H, d,
J=8Hz), 7.51 (1H, d, J=15Hz), 7.81 (1H, br d,
J=8Hz), 8.11 (1H, br s), 8.19 (1H, br d, J=8Hz),
8.32 (1H, br s)

30 its dihydrochloride

35 NMR (CDCl₃-CD₃OD, δ) : 2.42 (3H, s), 3.04 (3H, s), 3.28
(3H, s), 3.90 (1H, d, J=17Hz), 4.26 (1H, d,
J=17Hz), 4.38 (3H, s), 5.48 (1H, d, J=10Hz), 5.68
(1H, d, J=10Hz), 6.92 (1H, d, J=15Hz), 7.34-7.41
(2H, m), 7.51-7.59 (2H, m), 7.62 (1H, d, J=8Hz),

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7.74 (1H, t, J=8Hz), 7.96 (1H, d, J=8Hz), 8.09 (1H, d, J=8Hz), 8.52 (1H, br d, J=8Hz), 8.87 (1H, br s)

- 5 (12) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-(methylamino)pyridin-3-yl]acryloylglycyl]amino]-benzyloxy]-2-methylquinoline

10 NMR (CDCl₃, δ) : 2.73 (3H, s), 2.96 (3H, d, J=5Hz), 3.27 (3H, s), 3.63 (1H, dd, J=4, 17Hz), 3.94 (1H, dd, J=4, 17Hz), 4.83 (1H, q-like), 5.59-5.70 (2H, m), 6.27 (1H, d, J=16Hz), 6.38 (1H, d, J=8Hz), 6.53 (1H, t-like), 7.23-7.34 (3H, m), 7.36-7.51 (4H, m), 7.60 (1H, dd, J=8, 2Hz), 8.01 (1H, d, J=8Hz), 8.20 (1H, d, J=2Hz)

- 15 (13) 8-[3-[N-[3-(6-Acetamidopyridin-3-yl)propionylglycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline

20 NMR (CDCl₃, δ) : 2.20 (3H, s), 2.46 (2H, t, J=7.5Hz), 2.73 (3H, s), 2.88 (2H, t, J=7.5Hz), 3.23 (3H, s), 3.50 (1H, dd, J=4, 17Hz), 3.84 (1H, dd, J=5, 17Hz), 5.56-5.69 (2H, m), 6.96 (1H, t-like), 7.16-7.33 (3H, m), 7.33-7.56 (4H, m), 7.95-8.05 (2H, m), 8.11 (1H, d, J=8Hz), 8.69 (1H, s)

- 25 (14) 8-[3-[N-[2-(2-Benzothiazolylamino)acetyl]glycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline

30 NMR (CDCl₃, δ) : 2.64 (3H, s), 3.21 (3H, s), 3.91 (2H, t, J=5Hz), 4.10 (1H, d, J=16Hz), 4.20 (1H, d, J=16Hz), 5.58 (2H, s), 6.85-7.35 (7H, m), 7.40-7.61 (5H, m), 8.05 (1H, d, J=8Hz)

Example 3

To a solution of 8-[2,6-dichloro-3-[N-[(E)-3-(6-ethoxycarbonylpyridin-3-yl)acryloylglycyl]-N-methylamino]benzyloxy]-2-methylquinoline (2.07 g) in ethanol (20 ml) was added 1N sodium hydroxide solution (3.75 ml) at

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ambient temperature. The mixture was stirred for 3 hours at 60°C. The reaction mixture was adjusted to pH 4 with 1N hydrochloric acid and concentrated. The residue was purified by flash chromatography (dichloromethane - methanol) to give
5 8-[3-[N-[(E)-3-(6-carboxypyridin-3-yl)acryloylglycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline (1.71 g) as an amorphous powder.

NMR (DMSO-d₆, δ) : 2.58 (3H, s), 3.13 (3H, s), 3.50 (1H, dd, J=4, 16Hz), 3.80 (1H, dd, J=4, 16Hz), 5.46 (1H, d, J=10Hz), 5.53 (1H, d, J=10Hz), 6.95 (1H, d, J=16Hz), 7.30-7.57 (5H, m), 7.78 (2H, s-like), 8.02 (1H, d, J=8Hz), 8.10 (1H, d, J=7.5Hz), 8.20 (1H, d, J=8Hz), 8.45 (1H, t-like), 8.85 (1H, s-like)

15 Example 4

8-[3-[N-(4-Carboxycinnamoylglycyl)-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Example 3.

mp : 237.8-240.9°C

20 NMR (DMSO-d₆, δ) : 2.61 (3H, s), 3.15 (3H, s), 3.51 (1H, dd, J=4, 18Hz), 3.81 (1H, dd, J=4, 18Hz), 5.48 (1H, d, J=10Hz), 5.54 (1H, d, J=10Hz), 6.90 (1H, d, J=16Hz), 7.32-7.60 (5H, m), 7.64-7.75 (2H, m), 7.75-7.85 (2H, m), 7.96 (2H, d, J=8Hz), 8.21 (1H, d, J=8Hz), 8.35-8.44 (1H, m)

25 Example 5

To a mixture of 8-[3-[N-[(E)-3-(6-aminopyridin-3-yl)acryloylglycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline (90.0 mg), 2-pyrazinecarboxylic acid (24.3 mg) and dimethylformamide (0.9 ml) were added 1-ethyl-3-(3-dimethylaminopropyl)carbodiimide hydrochloride (43.9 mg) and 1-hydroxybenzotriazole (35.4 mg). After being stirred for 37 hours at ambient temperature, the mixture was poured into
35 saturated sodium bicarbonate solution and extracted with

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chloroform. The organic layer was separated, washed with water, dried over magnesium sulfate and evaporated in vacuo. The residue was purified by preparative thin-layer chromatography (chloroform-methanol) to give 8-[2,6-dichloro-3-[N-methyl-N-[(E)-3-[6-(2-pyrazinecarboxamido)-pyridin-3-yl]acryloyl]glycyl]amino]benzyloxy]-2-methylquinoline (43.7 mg) as a solid.

mp : 220-231°C

NMR (CDCl₃, δ) : 2.72 (3H, s), 3.28 (3H, s), 3.69 (1H, dd, J=16.5, 4.5Hz), 3.96 (1H, dd, J=16.5, 4.5Hz), 5.64 (2H, s), 6.52 (1H, d, J=16.0Hz), 6.73 (1H, br t, J=4.5Hz), 7.22-7.51 (7H, m), 7.56 (1H, d, J=16.0Hz), 7.92 (1H, dd, J=8.5, 1.0Hz), 8.03 (1H, d, J=8.5Hz), 8.42 (1H, d, J=8.5Hz), 8.47 (1H, d, J=1.0Hz), 8.62 (1H, d, J=1.0Hz), 8.83 (1H, d, J=1.0Hz), 9.51 (1H, s)

its trihydrochloride

mp : 190-193°C

NMR (DMSO-d₆, δ) : 2.92 (3H, s), 3.17 (3H, s), 3.60 (1H, dd, J=16.5, 4.5Hz), 3.91 (1H, dd, J=16.5, 4.5Hz), 5.62 (1H, d, J=11.0Hz), 5.68 (1H, d, J=11.0Hz), 6.88 (1H, d, J=16.0Hz), 7.43 (1H, d, J=16.0Hz), 7.80-8.00 (5H, m), 8.14 (1H, dd, J=8.5, 1.0Hz), 8.31 (1H, d, J=8.5Hz), 8.37 (1H, t, J=4.5Hz), 8.61 (1H, d, J=1.0Hz), 8.86 (1H, m), 8.95-9.03 (2H, m), 9.35 (1H, s)

Example 6

The following compounds were obtained according to a similar manner to that of Example 5.

- (1) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-(6-methylpyridine-3-carboxamido)pyridin-3-yl]-acryloyl]glycyl]amino]benzyloxy]-2-methylquinoline

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mp : 167-177°C

5 NMR (CDCl₃, δ) : 2.65 (3H, s), 2.73 (3H, s), 3.27 (3H, s), 3.67 (1H, dd, J=16.5, 4.5Hz), 3.96 (1H, dd, J=16.5, 4.5Hz), 5.62 (1H, d, J=11.0Hz), 5.69 (1H, d, J=11.0Hz), 6.51 (1H, d, J=16.0Hz), 6.72 (1H, br t, J=4.5Hz), 7.23-7.33 (4H, m), 7.38-7.46 (2H, m), 7.49 (1H, d, J=8.5Hz), 7.55 (1H, d, J=16.0Hz), 7.90 (1H, dd, J=8.5, 1.0Hz), 8.03 (1H, d, J=8.5Hz), 8.13 (1H, dd, J=8.5, 1.0Hz), 8.38 (1H, d, J=8.5Hz), 10 8.40 (1H, d, J=1.0Hz), 8.71 (1H, s), 9.04 (1H, d, J=1.0Hz)

its trihydrochloride

mp : 198-213°C

15 NMR (DMSO-d₆, δ) : 2.72 (3H, s), 2.93 (3H, s), 3.17 (3H, s), 3.62 (1H, dd, J=16.5, 4.5Hz), 3.91 (1H, dd, J=16.5, 4.5Hz), 5.66 (2H, s), 6.88 (1H, d, J=16.0Hz), 7.44 (1H, d, J=16.0Hz), 7.75-8.01 (8H, m), 8.08-8.18 (1H, m), 8.26 (1H, d, J=8.5Hz), 8.32-20 8.42 (1H, m), 8.59-8.70 (2H, m), 8.93-9.07 (1H, m), 9.20 (1H, s)

25 (2) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-(2-methylthiopyridine-3-carboxamido)pyridin-3-yl]-acryloylglycyl]amino]benzyloxy]-2-methylquinoline

30 NMR (CDCl₃, δ) : 2.61 (3H, s), 2.73 (3H, s), 3.26 (3H, s), 3.68 (1H, dd, J=5, 18Hz), 3.95 (1H, dd, J=5, 18Hz), 5.65 (2H, s-like), 6.51 (1H, d, J=16Hz), 6.79 (1H, t-like), 7.13 (1H, dd, J=6, 8Hz), 7.24-7.35 (3H, m), 7.35-7.61 (4H, m), 7.90 (1H, dd, J=2, 8Hz), 7.95 (1H, dd, J=2, 8Hz), 8.03 (1H, d, J=8Hz), 8.35-8.45 (2H, m), 8.58 (1H, dd, J=2, 6Hz), 8.89 (1H, s)

35 its trihydrochloride

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5 NMR (DMSO-d₆, δ) : 2.49 (3H, s), 2.91 (3H, s),
3.16 (3H, s), 3.60 (1H, d, J=18Hz), 5.57-5.71 (2H,
m), 6.86 (1H, d, J=16Hz), 7.23 (1H, dd, J=6, 8Hz),
7.41 (1H, d, J=16Hz), 7.75-8.03 (7H, m), 8.03-8.15
(1H, m), 8.22 (1H, d, J=8Hz), 8.29-8.40 (1H, m),
8.51-8.65 (2H, m), 8.98 (1H, brpeak)

10 (3) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-[(2-
pyridyl)acetamido]pyridin-3-yl]acryloylglycyl]amino]-
benzyloxy]-2-methylquinoline

15 NMR (CDCl₃, δ) : 2.74 (3H, s), 3.26 (3H, s), 3.65 (1H,
dd, J=4, 18Hz), 3.86-4.00 (3H, m), 5.68-5.70 (2H,
m), 6.44 (1H, m, J=16Hz), 6.64 (1H, t-like), 7.20-
7.35 (6H, m), 7.35-7.55 (4H, m), 7.70 (1H, td, J=8,
2Hz), 7.80 (1H, dd, J=8, 2Hz), 8.03 (1H, d, J=8Hz),
8.21 (1H, d, J=8Hz), 8.39 (1H, d, J=2Hz), 8.70 (1H,
d, J=6Hz)

its trihydrochloride

20 NMR (CDCl₃, δ) : 2.86 (3H, s), 3.14 (3H, s), 3.57 (1H,
dd, J=4, 16Hz), 3.87 (1H, dd, J=4, 16Hz), 4.32 (2H,
s), 5.55-5.66 (2H, m), 6.81 (1H, d, J=16Hz), 7.38
(1H, d, J=16Hz), 7.71-7.95 (10H, m), 7.95-8.10 (1H,
m), 8.31 (1H, t, J=6Hz), 8.40 (1H, t, J=8Hz), 8.53
25 (1H, d, J=2Hz), 8.83 (1H, d, J=6Hz), 8.90 (1H,
brpeak)

30 (4) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-[(3-
pyridyl)acetamido]pyridin-3-yl]acryloylglycyl]amino]-
benzyloxy]-2-methylquinoline

35 NMR (CDCl₃, δ) : 2.73 (3H, s), 3.27 (3H, s), 3.66 (1H,
dd, J=4, 18Hz), 3.75 (2H, s), 3.94 (1H, dd, J=4,
18Hz), 5.59-5.70 (2H, m), 6.46 (1H, d, J=16Hz),
6.67 (1H, t-like), 7.20-7.36 (4H, m), 7.36-7.55
(4H, m), 7.70 (1H, d, J=8Hz), 7.83 (1H, dd, J=2,

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8Hz), 7.97-8.06 (2H, m), 8.19 (1H, d, J=8Hz), 8.33 (1H, d, J=2Hz), 8.54-8.62 (2H, m)

its trihydrochloride

5 NMR (DMSO-d₆, δ) : 2.88 (3H, s), 3.15 (3H, s), 3.57 (1H, dd, J=4, 16Hz), 3.89 (1H, dd, J=4, 16Hz), 4.09 (2H, s), 5.57-5.70 (2H, m), 6.81 (1H, d, J=16Hz), 7.38 (1H, d, J=16Hz), 7.75-7.95 (8H, m), 7.95-8.10 (2H, m), 8.30 (1H, t, J=6Hz), 8.49 (1H, d, J=8Hz), 10 8.53 (1H, d, J=2Hz), 8.83 (1H, d, J=6Hz), 8.88 (1H, s-like), 8.93 (1H, brpeak)

(5) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-(2-pyridinecarboxamido)pyridin-3-yl]acryloylglycyl]amino]-benzyloxy]-2-methylquinoline

15 NMR (CDCl₃, δ) : 2.75 (3H, s), 3.27 (3H, s), 3.68 (1H, dd, J=5, 18Hz), 3.95 (1H, dd, J=5, 18Hz), 5.60-5.70 (2H, m), 6.51 (1H, d, J=16Hz), 7.23-7.30 (3H, m), 7.33 (1H, d, J=8Hz), 7.38-7.61 (5H, m), 7.87-7.96 (2H, m), 20 8.03 (1H, d, J=8Hz), 8.30 (1H, d, J=8Hz), 8.41-8.49 (2H, m), 8.65 (1H, d, J=5Hz)

its trihydrochloride

25 NMR (DMSO-d₆, δ) : 2.93 (3H, s), 3.15 (3H, s), 3.60 (1H, dd, J=5, 16Hz), 3.92 (1H, dd, J=5, 16Hz), 5.63 (1H, d, J=10Hz), 5.70 (1H, d, J=10Hz), 6.86 (1H, d, J=16Hz), 7.43 (1H, d, J=16Hz), 7.70-8.03 (8H, m), 8.09-8.19 (2H, m), 8.24 (1H, d, J=8Hz), 8.30-8.40 (2H, m), 30 8.58 (1H, d, J=2Hz), 8.78 (1H, d, J=5Hz), 9.03 (1H, br d, J=8Hz)

(6) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-(3-pyridinecarboxamido)pyridin-3-yl]acryloylglycyl]-amino]benzyloxy]-2-methylquinoline

35 NMR (CDCl₃, δ) : 2.71 (3H, s), 3.26 (3H, s), 3.68 (1H,

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dd, J=4, 18Hz), 3.93 (1H, dd, J=4, 18Hz),
5.56-5.70 (2H, m), 6.52 (1H, d, J=16Hz), 6.72 (1H,
t-like), 7.21-7.56 (10H, m), 7.89 (1H, dd, J=2,
8Hz), 8.00-8.10 (2H, m), 8.41 (1H, d, J=2Hz), 8.71
5 (1H, d, J=6Hz), 8.92 (1H, d, J=2Hz)

its trihydrochloride

NMR (CDCl₃, δ) : 2.92 (3H, s), 3.15 (3H, s), 5.59-5.72
10 (2H, m), 6.86 (1H, d, J=16Hz), 7.43 (1H, d,
J=16Hz), 7.60-8.01 (6H, m), 8.10 (1H, dd, J=2,
8Hz), 8.25 (1H, d, J=8Hz), 8.31-8.49 (2H, m), 8.53-
8.65 (2H, m), 8.88 (1H, d, J=6Hz), 8.95-9.04 (1H,
m), 9.13 (1H, s-like), 9.23 (1H, s-like)

15 (7) 8-[2,6-Dichloro-3-[N-[(E)-3-[6-(2-methoxypyridine-3-
carboxamido)pyridin-3-yl]acryloylglycyl]-N-
methylamino]benzyloxy]-2-methylquinoline

NMR (CDCl₃, δ) : 2.71 (3H, s), 3.26 (3H, s), 3.67 (1H,
20 dd, J=4, 16Hz), 3.94 (1H, dd, J=4, 16Hz), 4.23 (3H,
s), 5.57-5.70 (2H, m), 6.50 (1H, d, J=16Hz), 6.74
(1H, t-like), 7.12 (1H, dd, J=8, 6Hz), 7.20-7.35
(4H, m), 7.35-7.50 (3H, m), 7.55 (1H, d, J=16Hz),
7.87 (1H, dd, J=2, 8Hz), 8.03 (1H, d, J=8Hz), 8.35
25 (1H, dd, J=6, 2Hz), 8.38-8.48 (2H, m), 8.57 (1H,
dd, J=8, 2Hz)

its trihydrochloride

NMR (DMSO-d₆, δ) : 2.95 (3H, s), 3.16 (3H, s), 3.60
30 (1H, dd, J=4, 16Hz), 5.55-5.72 (2H, m), 6.60 (1H,
t, J=8Hz), 6.85 (1H, d, J=16Hz), 7.40 (1H, d,
J=16Hz), 7.65-8.01 (8H, m), 8.01-8.12 (1H, m),
8.20-8.41 (2H, m), 8.43-8.60 (2H, m), 8.99 (1H,
brpeak)

35 (8) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-(2-

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methylpyridine-3-carboxamido)pyridin-3-yl]acryloyl]glycyl]amino]benzyloxy]-2-methylquinoline

NMR (CDCl₃, δ) : 2.71 (1H, s), 2.76 (3H, s), 3.25 (3H, s), 3.69 (1H, dd, J=4, 18Hz), 3.95 (1H, dd, J=5, 18Hz), 5.63 (3H, s), 6.48 (1H, d, J=16Hz), 6.87 (1H, t-like), 7.18-7.37 (4H, m), 7.37-7.57 (4H, m), 7.85 (1H, dd, J=2, 8Hz), 7.89 (1H, dd, J=2, 8Hz), 8.04 (1H, d, J=8Hz), 8.20 (1H, d, J=2Hz), 8.37 (1H, d, J=8Hz), 8.63 (1H, d, J=6Hz), 8.93 (1H, s)

(9) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-[2-(6-methyl-3-pyridyl)acetamido]pyridin-3-yl]acryloyl]glycyl]amino]-benzyloxy]-2-methylquinoline

NMR (CDCl₃, δ) : 2.57 (3H, s), 2.73 (3H, s), 3.26 (3H, s), 3.66 (1H, dd, J=4, 18Hz), 3.72 (2H, s), 3.94 (1H, dd, J=4, 18Hz), 5.58-5.70 (2H, m), 6.46 (1H, d, J=16Hz), 6.68 (1H, t-like), 7.18 (1H, d, J=8Hz), 7.23-7.62 (8H, m), 7.81 (1H, dd, J=2, 8Hz), 7.98-8.05 (2H, m), 8.19 (1H, d, J=8Hz), 8.32 (1H, d, J=2Hz), 8.45 (1H, d, J=2Hz)

its trihydrochloride

NMR (DMSO-d₆, δ) : 2.74 (3H, s), 2.89 (3H, s), 3.14 (3H, s), 3.57 (1H, dd, J=4, 16Hz), 3.88 (1H, dd, J=4, 16Hz), 4.04 (2H, s), 5.56-5.70 (2H, m), 6.81 (1H, d, J=16Hz), 7.40 (1H, d, J=16Hz), 7.78-8.13 (10H, m), 8.32 (1H, t-like), 8.42 (1H, dd, J=2, 8Hz), 8.53 (1H, d, J=2Hz), 8.75 (1H, d, J=2Hz), 8.94 (1H, brpeak)

(10) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-[2-(2-methyl-3-pyridyl)acetamido]pyridin-3-yl]acryloyl]glycyl]amino]-benzyloxy]-2-methylquinoline

NMR (CDCl₃, δ) : 2.58 (3H, s), 2.73 (3H, s), 3.26 (3H, s), 3.65 (1H, dd, J=4, 18Hz), 3.77 (2H, s), 3.93

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(1H, dd, J=5, 18Hz), 5.60-5.70 (2H, m), 6.47 (1H, d, J=16Hz), 6.68 (1H, t-like), 7.18 (1H, dd, J=6, 8Hz), 7.22-7.35 (3H, m), 7.35-7.59 (5H, m), 7.80-7.90 (2H, m), 8.02 (1H, d, J=8Hz), 8.21 (1H, d, J=8Hz), 8.32 (1H, d, J=2Hz), 8.50 (1H, d, J=6Hz)

its trihydrochloride

NMR (DMSO-d₆, δ) : 2.74 (3H, s), 2.90 (3H, s), 3.15 (3H, s), 3.56 (1H, dd, J=5, 16Hz), 4.11 (2H, s), 5.56-5.69 (2H, m), 6.31 (1H, d, J=16Hz), 7.38 (1H, d, J=16Hz), 7.76-8.10 (10H, m), 8.31 (1H, t-like), 8.47 (1H, d, J=8Hz), 8.53 (1H, d, J=2Hz), 8.71 (1H, dd, J=2, 6Hz), 8.95 (1H, br s)

15 Example 7

To a mixture of 8-[3-[N-[(E)-3-(6-carboxypyridin-3-yl)-acryloylglycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline (100 mg), 2-aminopyrazine (19.7 mg) and N,N-dimethylformamide (2 ml) were added 1-ethyl-3-(3-dimethylaminopropyl)carbodiimide hydrochloride (43 mg) and 1-hydroxybenzotriazole (35 mg), and the mixture was stirred for 36 hours at ambient temperature. The mixture was poured into water and extracted with ethyl acetate. The organic layer was washed with water, saturated sodium bicarbonate solution and brine, dried over magnesium sulfate, and concentrated in vacuo. The residue was purified by preparative thin-layer chromatography (methylene chloride - methanol) to give 8-[2,6-dichloro-3-[N-methyl-N-[(E)-3-[6-(2-pyrazinylcarbamoyl)-pyridin-3-yl]acryloylglycyl]amino]benzyloxy]-2-methylquinoline (21 mg) as an amorphous powder.

NMR (CDCl₃, δ) : 2.71 (3H, s), 3.30 (3H, s), 3.76 (1H, d, J=16Hz), 4.02 (1H, d, J=16Hz), 5.64 (2H, s), 6.71 (1H, d, J=16Hz), 7.22-7.43 (3H, m), 7.43-7.58 (3H, m), 7.64 (1H, d, J=16Hz), 7.99 (1H, dd, J=2, 8Hz), 8.09 (1H, d, J=8Hz), 8.23 (1H, d, J=8Hz),

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8.33-8.47 (2H, m), 8.71 (1H, s-like), 9.25 (1H, s)

its trihydrochloride

5 NMR (DMSO-d₆, δ) : 2.85 (3H, s), 3.15 (3H, s), 3.91 (1H, dd, J=5, 18Hz), 5.55-5.69 (2H, m), 7.08 (1H, d, J=16Hz), 7.55 (1H, d, J=16Hz), 7.68-7.93 (8H, m), 8.21-8.33 (2H, m), 8.41-8.53 (2H, m), 8.85 (1H, br peak), 8.94 (1H, s-like), 9.49 (1H, s-like)

10 Example 8

The following compounds were obtained according to a similar manner to that of Example 7.

15 (1) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-(2-thiazolylcarbamoyl)pyridin-3-yl]acryloylglycyl]amino]-benzyloxy]-2-methylquinoline

mp : 144-155°C

20 NMR (CDCl₃, δ) : 2.73 (3H, s), 3.30 (3H, s), 3.72 (1H, dd, J=16.5, 4.5Hz), 3.97 (1H, dd, J=16.5, 4.5Hz), 5.67 (2H, s), 6.70 (1H, d, J=16.0Hz), 6.83 (1H, br t, J=4.5Hz), 7.08 (1H, d, J=3.0Hz), 7.23-7.37 (4H, m), 7.39-7.57 (4H, m), 7.63 (1H, d, J=16.0Hz), 7.96-8.09 (2H, m), 8.27 (1H, d, J=8.5Hz), 8.73 (1H, s)

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its trihydrochloride

mp : 161-165°C

30 NMR (DMSO-d₆, δ) : 2.93 (3H, s), 3.16 (3H, s), 3.61 (1H, dd, J=16.5, 4.5Hz), 3.91 (1H, dd, J=16.5, 4.5Hz), 5.62 (1H, d, J=11.0Hz), 5.68 (1H, d, J=11.0Hz), 7.10 (1H, d, J=16.0Hz), 7.37 (1H, d, J=2.5Hz), 7.54 (1H, d, J=16.0Hz), 7.59 (1H, d, J=2.5Hz), 7.80-7.99 (5H, m), 8.21 (1H, d, J=7.5Hz), 8.27 (1H, dd, J=7.5, 1.0Hz), 8.49 (1H, t, J=4.5Hz), 35 8.91-9.03 (2H, m)

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(2) 8-[2,6-Dichloro-3-[N-[(E)-3-[6-(1-isoquinolylcarbamoyl)-pyridin-3-yl]acryloylglycyl]-N-methylamino]benzyloxy]-2-methylquinoline

mp : 127-135°C

5 NMR (CDCl₃, δ) : 2.72 (3H, s), 3.28 (3H, s), 3.72 (1H, dd, J=16.5, 4.5Hz), 3.98 (1H, dd, J=16.5, 4.5Hz), 5.64 (2H, s), 6.70 (1H, d, J=16.0Hz), 6.87 (1H, br t, J=4.5Hz), 7.23-7.47 (6H, m), 7.51 (1H, d, J=8.5Hz), 7.57 (1H, d, J=5.5Hz), 7.60-7.70 (2H, m), 10 7.73 (1H, t, J=7.5Hz), 7.86 (1H, d, J=7.5Hz), 8.00 (1H, dd, J=7.5, 1.0Hz), 8.03 (1H, d, J=8.5Hz), 8.13 (1H, d, J=7.5Hz), 8.32 (1H, d, J=7.5Hz), 8.43 (1H, d, J=5.5Hz), 8.76 (1H, s)

15 its trihydrochloride

mp : 143-145°C

NMR (DMSO-d₆, δ) : 2.93 (3H, s), 3.17 (3H, s), 3.63 (1H, dd, J=16.5, 4.5Hz), 3.94 (1H, dd, J=16.5, 4.5Hz), 5.63 (1H, d, J=11.0Hz), 5.70 (1H, d, J=11.0Hz), 20 7.13 (1H, d, J=16.0Hz), 7.61 (1H, d, J=16.0Hz), 7.78-8.02 (9H, m), 8.13 (1H, d, J=8.5Hz), 8.25-8.37 (3H, m), 8.41 (1H, d, J=7.0Hz), 8.53 (1H, t, J=4.5Hz), 8.93-9.07 (2H, m)

25 (3) 8-[2,6-Dichloro-3-[N-methyl-N-[4-[(1-oxo-3-pyridyl-methyl)carbamoyl]cinnamoylglycyl]amino]benzyloxy]-2-methylquinoline

mp : 142-163°C

NMR (CDCl₃, δ) : 2.70 (3H, s), 3.25 (3H, s), 3.63 (1H, dd, J=16.5, 4.5Hz), 3.97 (1H, dd, J=16.5, 4.5Hz), 30 4.51-4.62 (2H, m), 5.64 (2H, s), 6.56 (1H, d, J=16.0Hz), 7.03 (1H, br t, J=4.5Hz), 7.13-7.37 (6H, m), 7.40-7.51 (5H, m), 7.56 (1H, d, J=16.0Hz), 7.77-7.90 (3H, m), 7.99-8.07 (2H, m), 8.11 (1H, s)

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- (4) 8-[2,6-Dichloro-3-[N-[(E)-3-[6-(6-methoxypyridin-3-ylcarbamoyl)pyridin-3-yl]acryloylglycyl]-N-methylamino]benzyloxy]-2-methylquinoline

mp : 168-183°C

5 NMR (CDCl₃, δ) : 2.73 (3H, s), 3.27 (3H, s), 3.70 (1H, dd, J=16.5, 4.5Hz), 3.96 (3H, s), 3.98 (1H, dd, J=16.5, 4.5Hz), 5.66 (2H, s), 6.68 (1H, d, J=16.0Hz), 6.78-6.83 (2H, m), 7.24-7.37 (3H, m), 7.39-7.48 (2H, m), 7.51 (1H, d, J=8.5Hz), 7.64 (1H, d, J=16.0Hz), 7.97-8.07 (2H, m), 8.18 (1H, dd, J=8.5, 1.0Hz), 8.26 (1H, d, J=8.5Hz), 8.44 (1H, d, J=1.0Hz), 8.69 (1H, s), 9.82 (1H, s)

- 15 (5) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-(4-methyloxazol-2-ylcarbamoyl)pyridin-3-yl]acryloylglycyl]amino]benzyloxy]-2-methylquinoline

mp : 128-139°C

20 NMR (CDCl₃, δ) : 2.19 (3H, s), 2.72 (3H, s), 3.28 (3H, s), 3.73 (1H, dd, J=16.5, 5.5Hz), 3.97 (1H, dd, J=16.5, 5.5Hz), 5.64 (2H, s), 6.69 (1H, d, J=15.0Hz), 6.88 (1H, br t, J=5.5Hz), 7.21-7.35 (5H, m), 7.40-7.53 (3H, m), 7.61 (1H, d, J=15.0Hz), 7.98 (1H, dd, J=8.5, 1.0Hz), 8.03 (1H, d, J=8.5Hz), 8.25 (1H, d, J=8.5Hz), 8.68 (1H, d, J=1.0Hz)

- 25 (6) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-(2-methyl-2H-pyrazol-3-ylcarbamoyl)pyridin-3-yl]acryloylglycyl]-amino]benzyloxy]-2-methylquinoline

30 NMR (CDCl₃, δ) : 2.74 (3H, s), 3.27 (3H, s), 3.70 (1H, dd, J=4, 18Hz), 3.85 (3H, s), 3.95 (1H, dd, J=4, 18Hz), 5.60-5.70 (2H, m), 6.65 (1H, d, J=16Hz), 6.75 (1H, t-like), 6.83 (1H, d, J=2Hz), 7.20-7.36 (5H, m), 7.36-7.54 (3H, m), 7.62 (1H, d, J=16Hz), 7.97 (1H, dd, J=2, 8Hz), 8.03 (1H, d, J=8Hz), 8.24 (1H, d, J=8Hz), 8.68 (1H, d, J=2Hz)

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its trihydrochloride

NMR (DMSO-d₆, δ) : 2.92 (3H, s), 3.15 (3H, s), 3.80 (3H, s), 3.91 (1H, dd, J=5, 16Hz), 5.61 (1H, d, J=10Hz), 5.68 (1H, d, J=10Hz), 6.61 (1H, d, J=2Hz), 7.06 (1H, d, J=16Hz), 7.54 (1H, d, J=16Hz), 7.59-7.76 (2H, m), 7.76-8.01 (6H, m), 8.15 (1H, d, J=8Hz), 8.24 (1H, dd, J=8, 2Hz), 8.45 (1H, t-like), 8.88 (1H, d, J=2Hz), 8.99 (1H, br peak)

10 Example 9

To a solution of 3-[N-[4-(methylcarbamoyl)-cinnamoylglycyl]-N-methylamino]-2,6-dichlorobenzyl bromide (60 mg) and 4-ethoxy-8-hydroxy-2-methylquinoline (24.9 mg) in dimethylformamide (0.6 ml) was added potassium carbonate (48.5 mg), and the mixture was stirred for 5 hours at ambient temperature. Water was added thereto, and the mixture was extracted with dichloromethane. The extract was washed with water, dried over magnesium sulfate and concentrated. The residue was purified by preparative thin-layer chromatography (dichloromethane:methanol = 15:1, V/V) to give 8-[2,6-dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)cinnamoylglycyl]-amino]benzyloxy]-4-ethoxy-2-methylquinoline (67 mg) as an amorphous powder.

NMR (CDCl₃, δ) : 1.56 (3H, t, J=7.5Hz), 2.66 (3H, s), 3.00 (3H, d, J=5Hz), 3.26 (3H, s), 3.65 (1H, dd, J=17, 4Hz), 3.93 (1H, dd, J=17, 5Hz), 4.22 (2H, q, J=7.5Hz), 5.59 (1H, d, J=10Hz), 5.64 (1H, d, J=10Hz), 6.31 (1H, br d, J=5Hz), 6.52 (1H, d, J=15Hz), 6.61 (1H, s), 6.73 (1H, br s), 7.21-7.31 (2H, m), 7.37 (1H, t, J=8Hz), 7.43-7.61 (4H, m), 7.74 (2H, d, J=8Hz), 7.87 (1H, d, J=8Hz)

its hydrochloride

NMR (CDCl₃-CD₃OD, δ) : 1.68 (3H, br t, J=7.5Hz), 2.98 (3H, s), 3.00 (3H, s), 3.29 (3H, s), 3.88 (1H, d,

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5 J=17Hz), 4.10 (1H, d, J=17Hz), 4.60 (2H, q, J=7.5Hz), 5.52 (1H, d, J=10Hz), 5.69 (1H, d, J=10Hz), 6.63 (1H, d, J=15Hz), 7.29-7.32 (1H, overlapped with H₂O), 7.41 (1H, d, J=15Hz), 7.50-7.60 (5H, m), 7.72 (1H, d, J=8Hz), 7.79 (2H, d, J=8Hz), 7.98 (1H, d, J=8Hz)

Example 10

10 The following compounds were obtained according to a similar manner to that of Example 9.

(1) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)-cinnamoylglycyl]amino]benzyloxy]-4-isopropoxy-2-methylquinoline

15 NMR (CDCl₃, δ) : 1.48 (6H, d, J=7Hz), 2.64 (3H, s), 3.00 (3H, d, J=5Hz), 3.25 (3H, s), 3.66 (1H, dd, J=17, 4Hz), 3.93 (1H, dd, J=17, 5Hz), 4.75-4.85 (1H, m), 5.59 (1H, d, J=10Hz), 5.62 (1H, d, J=10Hz), 6.32 (1H, br d, J=5Hz), 6.52 (1H, d, J=15Hz), 6.61 (1H, s), 6.75 (1H, br s), 7.20-7.38 (3H, m), 7.42-7.60 (4H, m), 7.74 (2H, d, J=8Hz), 7.83 (1H, d, J=8Hz)

its hydrochloride

25 NMR (CDCl₃-CD₃OD, δ) : 1.60 (6H, br d, J=7Hz), 2.98 (3H, s), 2.99 (3H, s), 3.28 (3H, s), 3.88 (1H, d, J=17Hz), 4.15 (1H, d, J=17Hz), 5.15-5.26 (1H, m), 5.50 (1H, d, J=10Hz), 5.67 (1H, d, J=10Hz), 6.64 (1H, d, J=15Hz), 7.25 (1H, br s), 7.39 (1H, d, J=15Hz), 7.49-7.61 (5H, m), 7.71 (1H, t, J=8Hz), 7.79 (2H, br d, J=8Hz), 7.95 (1H, d, J=8Hz)

35 (2) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)-cinnamoylglycyl]amino]benzyloxy]-4-(2-methoxyethoxy)-2-methylquinoline

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5 NMR (CDCl₃, δ) : 2.66 (3H, s), 3.00 (3H, d, J=5Hz),
3.24 (3H, s), 3.50 (3H, s), 3.63 (1H, dd, J=17,
4Hz), 3.87-3.98 (3H, m), 4.29-4.33 (2H, m), 5.61
(2H, br s), 6.31 (1H, br d, J=5Hz), 6.52 (1H, d,
J=15Hz), 6.63 (1H, s), 6.73 (1H, br s), 7.21-7.61
(7H, m), 7.74 (2H, d, J=8Hz), 7.98 (1H, d, J=8Hz)

its hydrochloride

10 NMR (CDCl₃-CD₃OD, δ) : 2.99 (3H, s), 3.00 (3H, s), 3.28
(3H, s), 3.49 (3H, s), 3.78 (1H, br d, J=17Hz),
3.92-4.00 (2H, m), 4.13 (1H, br d, J=17Hz), 4.68-
4.75 (2H, m), 5.52 (1H, d, J=10Hz), 5.67 (1H, d,
J=10Hz), 6.65 (1H, d, J=15Hz), 7.32-7.60 (7H, m),
15 7.69-7.82 (3H, m), 8.00 (1H, d, J=8Hz)

(3) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)-
cinnamoyl]glycyl]amino]benzyloxy]-4-(2-
dimethylaminoethoxy)-2-methylquinoline

20 NMR (CDCl₃, δ) : 2.41 (6H, s), 2.66 (3H, s), 2.91 (2H,
t, J=6Hz), 3.00 (3H, d, J=5Hz), 3.25 (3H, s), 3.64
(1H, dd, J=17, 4Hz) 3.92 (1H, dd, J=17, 5Hz), 4.29
(2H, t, J=6Hz), 5.59 (1H, d, J=10Hz), 5.64 (1H, d,
J=10Hz), 6.29 (1H, br d, J=5Hz), 6.52 (1H, d,
J=15Hz), 6.63 (1H, s), 6.73 (1H, br t, J=5Hz),
25 7.21-7.29 (3H, m), 7.33-7.60 (4H, m), 7.74 (2H, d,
J=8Hz), 7.83 (1H, d, J=8Hz)

its dihydrochloride

30 NMR (CDCl₃-CD₃OD, δ) : 2.87-3.00 (8H, m), 3.06 (6H, br
s), 3.29 (3H, s), 3.79-3.99 (4H, m), 5.02-5.14 (2H,
m), 5.49 (1H, d, J=10Hz), 5.69 (1H, d, J=10Hz),
6.59 (1H, d, J=15Hz), 7.38-7.61 (7H, m), 7.71-7.82
(3H, m), 8.42 (1H, d, J=8Hz)

35 (4) 4-Cyclopentyloxy-8-[2,6-dichloro-3-[N-methyl-N-[4-

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(methylcarbamoyl) cinnamoylglycyl]amino]benzyloxy]-2-methylquinoline

5 NMR (CDCl₃, δ) : 1.62-2.06 (8H, m), 2.64 (3H, s), 3.00 (3H, d, J=5Hz), 3.24 (3H, s), 3.66 (1H, dd, J=17, 4Hz), 3.92 (1H, dd, J=17, 5Hz), 4.94-5.00 (1H, m), 5.59 (1H, d, J=10Hz), 5.62 (1H, d, J=10Hz), 6.36 (1H, br d, J=5Hz), 6.52 (1H, d, J=15Hz), 6.61 (1H, s), 6.76 (1H, br s), 7.20-7.38 (3H, m), 7.42-7.60 (4H, m), 7.73 (2H, br d, J=8Hz), 7.80 (1H, d, J=8Hz)

its hydrochloride

15 NMR (CDCl₃-CD₃OD, δ) : 1.76-2.26 (8H, m), 2.99 (6H, s), 3.28 (3H, s), 3.88 (1H, d, J=17Hz), 4.20 (1H, d, J=17Hz), 5.30-5.38 (1H, m), 5.51 (1H, d, J=10Hz), 5.63 (1H, d, J=10Hz), 6.67 (1H, d, J=15Hz), 7.15 (1H, br s), 7.37 (1H, d, J=15Hz), 7.45-7.60 (5H, m), 7.67-7.79 (3H, m), 7.89 (1H, d, J=8Hz)

20 (5) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)-cinnamoylglycyl]amino]benzyloxy]-4-dimethylamino-2-methylquinoline

25 NMR (CDCl₃, δ) : 2.66 (3H, br s), 3.00 (3H, d, J=5Hz), 3.09 (6H, br s), 3.25 (3H, s), 3.72 (1H, br dd, J=17, 4Hz), 3.99 (1H, br dd, J=17, 5Hz), 5.09 (2H, s), 6.48 (1H, br s), 6.57 (1H, br d, J=15Hz), 6.67 (1H, s), 7.20-7.56 (8H, m), 7.68-7.74 (3H, m)

its dihydrochloride

30 NMR (CDCl₃-CD₃OD, δ) : 2.71 (3H, s), 2.99 (3H, s), 3.28 (3H, s), 3.50 (6H, s), 3.87 (1H, d, J=17Hz), 4.19 (1H, d, J=17Hz), 5.47 (1H, d, J=10Hz), 5.62 (1H, d, J=10Hz), 6.63 (1H, d, J=15Hz), 6.72 (1H, br s), 7.33 (1H, d, J=15Hz), 7.41-7.61 (6H, m), 7.77-7.82 (3H, m)

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(6) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)-
cinnamoylglycyl]amino]benzyloxy]-4-
ethoxycarbonylmethylamino-2-methylquinoline

5 NMR (CDCl₃-CD₃OD, δ) : 1.32 (3H, t, J=7.5Hz), 2.54 (3H,
s), 2.98 (3H, s), 3.25 (3H, s), 3.73 (1H, d,
J=17Hz), 3.97 (1H, d, J=17Hz), 4.15 (2H, br s),
4.30 (2H, q, J=7.5Hz), 5.50 (1H, d, J=10Hz), 5.56
10 (1H, d, J=10Hz), 6.21 (1H, s), 6.52 (1H, d,
J=15Hz), 7.26 (1H, br d, J=7.5Hz), 7.36-7.52 (6H,
m), 7.62-7.78 (3H, m)

its dihydrochloride

15 NMR (CDCl₃-CD₃OD, δ) : 1.30 (3H, t, J=7.5Hz), 2.66 (3H,
s), 2.99 (3H, s), 3.29 (3H, s), 3.91 (2H, br s),
4.25 (2H, q, J=7.5Hz), 4.41 (2H, br s), 5.46 (1H,
d, J=10Hz), 5.62 (1H, d, J=10Hz), 6.24 (1H, s),
6.58 (1H, d, J=15Hz), 7.38 (1H, d, J=15Hz), 7.42-
7.48 (3H, m), 7.50 (1H, d, J=7.5Hz), 7.58 (1H, d,
J=7.5Hz), 7.66 (1H, t, J=7.5Hz), 7.78 (2H, d,
20 J=7.5Hz), 8.35 (1H, br d, J=7.5Hz)

(7) 4-Allylamino-8-[2,6-dichloro-3-[N-methyl-N-[4-
(methylcarbamoyl)cinnamoylglycyl]amino]benzyloxy]-2-
methylquinoline

25 NMR (CDCl₃-CD₃OD, δ) : 2.54 (3H, s), 2.98 (3H, s), 3.25
(3H, s), 3.79 (1H, d, J=17Hz), 3.94 (1H, d,
J=17Hz), 4.08 (2H, br d, J=6Hz), 5.20-5.33 (2H, m),
5.48 (1H, d, J=10Hz), 5.57 (1H, d, J=10Hz), 5.88-
6.02 (1H, m), 6.29 (1H, s), 6.56 (1H, d, J=15Hz),
30 7.29 (1H, d, J=8Hz), 7.39-7.54 (6H, m), 7.69 (2H,
d, J=8Hz), 7.88 (1H, br d, J=8Hz)

its dihydrochloride

35 NMR (CDCl₃-CD₃OD, δ) : 2.61 (3H, s), 2.99 (3H, s), 3.28
(3H, s), 3.91 (2H, br s), 4.22 (2H, br d, J=6Hz),

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5.20-5.31 (2H, m), 5.44 (1H, d, J=10Hz), 5.61 (1H, d, J=10Hz), 5.83-5.98 (1H, m), 6.29 (1H, s), 6.58 (1H, d, J=15Hz), 7.32-7.47 (4H, m), 7.50 (1H, d, J=8Hz), 7.66 (1H, d, J=8Hz), 7.63 (1H, t, J=8Hz), 7.78 (2H, d, J=8Hz), 8.42 (1H, br d, J=8Hz)

(8) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)-cinnamoylglycyl]amino]benzyloxy]-4-(2-dimethylaminoethylamino)-2-methylquinoline

10 NMR (CDCl₃, δ) : 2.31 (6H, s), 2.57 (3H, s), 2.69 (2H, br t, J=6Hz), 2.99 (3H, d, J=5Hz), 3.21-3.33 (5H, m), 3.69 (1H, br dd, J=17, 4Hz), 3.93 (1H, br dd, J=17, 5Hz), 5.57 (1H, d, J=10Hz), 5.61 (1H, d, J=10Hz), 5.79 (1H, br s), 6.31 (1H, s), 6.45 (1H, br s), 6.53 (1H, d, J=15Hz), 6.88 (1H, br s), 7.19 (1H, br d, J=8Hz), 7.25-7.37 (2H, m), 7.40-7.60 (5H, m), 7.73 (2H, br d, J=8Hz)

its trihydrochloride

20 NMR (CDCl₃-CD₃OD, δ) : 2.75 (3H, br s), 2.99 (9H, br s), 3.18-3.27 (3H, overlapped with H₂O), 3.57-3.68 (2H, m), 3.81 (1H, d, J=17Hz), 3.95 (1H, d, J=17Hz), 4.10-4.20 (2H, m), 5.46 (1H, d, J=10Hz), 5.67 (1H, d, J=10Hz), 6.59 (1H, d, J=15Hz), 7.40-7.70 (8H, m), 7.80 (2H, br d, J=8Hz), 8.33 (1H, br d, J=8Hz)

(9) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)-cinnamoylglycyl]amino]benzyloxy]-4-(2-methoxyethylamino)-2-methylquinoline

30 NMR (CDCl₃-CD₃OD, δ) : 2.53 (3H, s), 2.98 (3H, s), 3.26 (3H, s), 3.41 (3H, s), 3.55 (2H, br t, J=6Hz), 3.70-3.80 (3H, m), 3.97 (1H, br d, J=17Hz), 5.49 (1H, d, J=10Hz), 5.56 (1H, d, J=10Hz), 6.39 (1H, s), 6.54 (1H, d, J=15Hz), 7.22 (1H, br d, J=7.5Hz),

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7.38-7.53 (6H, m), 7.64-7.71 (3H, m)

its dihydrochloride

5 NMR (CDCl₃-CD₃OD, δ) : 2.63 (3H, s), 2.99 (3H, s), 3.29 (3H, s), 3.38 (3H, s), 3.78 (4H, s), 3.92 (2H, br s), 5.45 (1H, d, J=10Hz), 5.61 (1H, d, J=10Hz), 6.53-6.63 (2H, m), 7.36-7.68 (7H, m), 7.79 (2H, br d, J=7.5Hz), 8.31 (1H, d, J=7.5Hz)

10 (10) 4-[Bis(2-methoxyethyl)amino]-8-[2,6-dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)cinnamoylglycyl]amino]-benzyloxy]-2-methylquinoline

15 NMR (CDCl₃, δ) : 2.68 (3H, br s), 3.00 (3H, d, J=5Hz), 3.25 (3H, s), 3.30 (6H, s), 3.50-3.74 (9H, m), 3.98 (1H, br dd, J=17, 5Hz), 5.60 (2H, s), 6.36 (1H, br s), 6.57 (1H, d, J=15Hz), 6.88 (1H, s), 7.21 (1H, br d, J=8Hz), 7.30-7.60 (6H, m), 7.73 (2H, br d, J=8Hz), 7.79 (1H, d, J=8Hz)

20 its dihydrochloride

25 NMR (CDCl₃-CD₃OD, δ) : 2.71 (3H, s), 2.99 (3H, s), 3.28 (3H, s), 3.38 (6H, s), 3.24-3.71 (4H, m), 3.88 (1H, d, J=17Hz), 4.00-4.08 (4H, m), 4.19 (1H, d, J=17Hz), 5.47 (1H, d, J=10Hz), 5.64 (1H, d, J=17Hz), 6.65 (1H, d, J=15Hz), 6.97 (1H, br s), 7.38 (1H, d, J=15Hz), 7.44 (1H, d, J=8Hz), 7.49-7.61 (5H, m), 7.81 (2H, d, J=8Hz), 7.94 (1H, d, J=8Hz)

30 (11) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)cinnamoylglycyl]amino]benzyloxy]-2-methyl-4-(piperidino)quinoline

35 NMR (CDCl₃, δ) : 1.64-1.90 (6H, m), 2.63 (3H, s), 2.99 (3H, d, J=5Hz), 3.10-3.28 (7H, m), 3.70 (1H, br d, J=17Hz), 3.96 (1H, br d, J=17Hz), 5.58 (1H, d,

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J=10Hz), 5.62 (1H, d, J=10Hz), 6.36 (1H, br d, J=5Hz), 6.55 (1H, d, J=15Hz), 6.72 (1H, s), 7.20 (1H, d, J=8Hz), 7.28-7.59 (7H, m), 7.64 (1H, d, J=8Hz), 7.73 (2H, br d, J=8Hz)

5

its dihydrochloride

NMR (CDCl₃-CD₃OD, δ) : 1.81-1.96 (6H, m), 2.78 (3H, br s), 2.99 (3H, s), 3.27 (3H, s), 3.69-3.79 (4H, m), 3.87 (1H, br d, J=17Hz), 4.28 (1H, br d, J=17Hz), 5.48 (1H, br d, J=10Hz), 5.61 (1H, br d, J=10Hz), 6.68 (1H, br d, J=15Hz), 6.85 (1H, br s), 7.32 (1H, br d, J=15Hz), 7.39-7.62 (7H, m), 7.78 (2H, br d, J=8Hz)

10

15 (12) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)-cinnamoylglycyl]amino]benzyloxy]-2-methyl-4-(morpholino)quinoline

NMR (CDCl₃, δ) : 2.67 (3H, br s), 3.00 (3H, d, J=5Hz), 3.15-3.28 (7H, m), 3.68 (1H, br dd, J=17, 4Hz), 3.88-4.02 (5H, m), 5.62 (2H, br s), 6.37 (1H, br s), 6.53 (1H, br d, J=15Hz), 6.72-6.80 (2H, m), 7.20-7.70 (8H, m), 7.75 (2H, br d, J=8Hz)

20

its dihydrochloride

25 NMR (CDCl₃-CD₃OD, δ) : 2.80-2.90 (3H, overlapped with H₂O), 2.98 (3H, s), 3.28 (3H, s), 3.74-3.82 (4H, m), 3.88 (1H, d, J=17Hz), 3.97-4.03 (4H, m), 4.12 (1H, d, J=17Hz), 5.49 (1H, d, J=10Hz), 5.65 (1H, d, J=10Hz), 6.65 (1H, d, J=15Hz), 7.07 (1H, br s), 7.38 (1H, d, J=15Hz), 7.46-7.69 (7H, m), 7.79 (2H, br d, J=8Hz)

30

Example 11

35 (1) 8-[3-Glycylamino-2,6-dichlorobenzyloxy]-2-methylquinoline was obtained from 8-[2,6-dichloro-3-

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(phthalimidoacetylaminobenzoyloxy)-2-methylquinoline according to a similar manner to that of Preparation 11.

NMR (CDCl₃, δ) : 2.73 (3H, s), 3.52 (2H, s), 5.62 (2H, s), 7.20-7.45 (5H, m), 8.01 (1H, d, J=8.5Hz), 8.51 (1H, d, J=8.5Hz)

(2) 8-[3-[(E)-3-(6-Acetamidopyridin-3-yl)acryloyl]glycylamino]-2,6-dichlorobenzoyloxy]-2-methylquinoline was obtained according to a similar manner to that of Example 1.

mp : 272-282°C

NMR (DMSO-d₆, δ) : 2.11 (3H, s), 2.60 (3H, s), 4.14 (2H, d, J=5.5Hz), 5.47 (2H, s), 6.76 (1H, d, J=16Hz), 7.34-7.57 (5H, m), 7.60 (1H, d, J=9Hz), 7.92 (1H, d, J=9.0Hz), 8.00 (1H, d, J=9.0Hz), 8.11 (1H, d, J=9.0Hz), 8.20 (1H, d, J=9.0Hz), 8.45-8.60 (2H, m), 9.80 (1H, s), 10.67 (1H, s)

Example 12

(1) 8-[2,6-Dichloro-3-(N-ethyl-N-phthalimidoacetylaminobenzoyloxy)-2-methylquinoline was obtained by reacting 8-[2,6-dichloro-3-(phthalimidoacetylaminobenzoyloxy)-2-methylquinoline with ethyl iodide according to a similar manner to that of Preparation 10.

NMR (CDCl₃, δ) : 1.23 (3H, t, J=6Hz), 2.73 (3H, s), 3.39 (1.2H, q, J=6Hz), 3.95-4.10 (2.8H, m), 5.70 (1H, d, J=12Hz), 5.75 (1H, d, J=12Hz), 7.24-7.47 (5H, m), 7.53 (1H, d, J=8Hz), 7.70-7.76 (2H, m), 7.83-7.89 (2H, m), 8.02 (1H, d, J=8Hz)

(2) 8-[2,6-Dichloro-3-(N-ethyl-N-glycylamino)benzoyloxy]-2-methylquinoline was obtained according to a similar manner to that of Preparation 11.

NMR (CDCl₃, δ) : 1.13 (1.5H, t, J=6Hz), 1.14 (1.5H, t, J=6Hz), 2.74 (3H, s), 2.94 (1H, d, J=18Hz), 3.04

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(1H, d, J=18Hz), 3.33 (1H, q, J=6Hz), 4.10 (1H, q, J=6Hz), 5.67 (2H, s), 7.16-7.48 (6H), 8.02 (1H, d, J=8Hz)

- 5 (3) 8-[3-[N-[(E)-3-(6-Acetamidopyridin-3-yl)acryloyl]glycyl]-N-ethylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Example 1.

10 NMR (CDCl₃, δ) : 1.18 (3H, t, J=6Hz), 2.23 (3H, s), 2.74 (3H, s), 3.38 (1H, q, J=6Hz), 3.64 (1H, dd, J=18, 4Hz), 3.92 (1H, dd, J=18, 4Hz), 4.15 (1H, q, J=6Hz), 5.67 (2H, s), 6.47 (1H, d, J=15Hz), 6.71 (1H, t, J=4Hz), 7.23-7.56 (7H), 7.83 (1H, dd, J=8, 2Hz), 8.02 (1H, d, J=8Hz), 8.10 (1H, s), 8.20 (1H, d, J=8Hz), 8.35 (1H, d, J=2Hz)

its dihydrochloride

20 NMR (CDCl₃-CD₃OD, δ) : 1.20 (3H, t, J=6Hz), 2.42 (3H, s), 3.12 (3H, s), 3.67 (1H, q, J=6Hz), 3.86 (1H, d, J=18Hz), 3.96 (1H, q, J=6Hz), 4.23 (1H, d, J=18Hz), 5.56 (1H, d, J=10Hz), 5.76 (1H, d, J=10Hz), 6.86 (1H, d, J=15Hz), 7.42 (1H, d, J=15Hz), 7.56-7.70 (3H), 7.80-8.02 (4H), 8.53 (1H, d, J=8Hz), 8.81 (1H, s), 8.90 (1H, d, J=8Hz)

25

- (4) 8-[2,6-Dichloro-3-[N-ethyl-N-[4-(methylcarbamoyl)-cinnamoyl]glycyl]amino]benzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Example 1.

30 NMR (CDCl₃, δ) : 1.17 (3H, t, J=6Hz), 2.72 (3H, s), 3.02 (3H, d, J=4Hz), 3.37 (1H, q, J=6Hz), 3.64 (1H, dd, J=18, 4Hz), 3.90 (1H, dd, J=18, 4Hz), 4.15 (1H, q, J=6Hz), 5.67 (2H, s), 6.25 (1H, q, J=4Hz), 6.52 (1H, d, J=15Hz), 6.71 (1H, t, J=4Hz), 7.23-7.62 (9H), 7.75 (2H, d, J=8Hz), 8.03 (1H, d, J=8Hz)

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its hydrochloride

NMR (CDCl₃-CD₃OD, δ) : 1.21 (3H, t, J=6Hz), 2.99 (3H, s), 3.11 (3H, s), 3.60 (1H, q, J=6Hz), 3.85-4.07 (3H), 5.60 (1H, d, J=12Hz), 5.75 (1H, d, J=12Hz), 6.64 (1H, d, J=15Hz), 7.44 (1H, d, J=15Hz), 7.50-7.98 (10H), 8.94 (1H, d, J=8Hz)

Example 13

To a solution of 8-[3-(N-glycyl-N-methylamino)-2,6-dichlorobenzyloxy]-2-methylquinoline (404 mg) and triethylamine (120 mg) in dichloromethane (8 ml) was added bromoacetyl bromide (220 mg) at 5°C. After stirring for 30 minutes at the same temperature, the mixture was washed with water and saturated sodium bicarbonate solution, dried over magnesium sulfate, and concentrated. The residue was purified by flash chromatography (dichloromethane - methanol) to give 8-[3-[N-(bromoacetyl)glycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline (327 mg) as an amorphous powder.

NMR (CDCl₃, δ) : 2.77 (3H, s), 3.27 (3H, s), 3.55 (1H, dd, J=14, 4Hz), 3.83 (1H, dd, J=14, 4Hz), 3.89 (2H, s), 5.68 (2H, s), 7.23-7.47 (5H, m), 7.50 (1H, d, J=7.5Hz), 8.06 (1H, d, J=7.5Hz)

Example 14

A mixture of 8-[3-[N-(bromoacetyl)glycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline (200 mg) and tri-n-butylphosphine (140 μ l) in tetrahydrofuran (4 ml) was stirred for 2 hours at ambient temperature. The mixture was concentrated, and the residue was purified by flash chromatography (dichloromethane - methanol) to give 8-[3-[N-[2-(tri-n-butylphosphonio)acetyl)glycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline bromide (128 mg) as an amorphous powder.

NMR (DMSO-d₆, δ) : 0.91 (9H, t, J=7.5Hz), 1.31-1.56

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(12H, m), 2.20-2.31 (6H, m), 2.61 (3H, s), 3.15 (3H, s), 3.43-3.58 (3H, m), 3.72 (1H, dd, J=15, 4Hz), 5.52 (2H, s), 7.37-7.57 (4H, m), 7.78 (2H, s), 8.22 (1H, d, J=7.5Hz), 8.74 (1H, t, J=4Hz)

Example 15

A mixture of 8-[3-[N-(bromoacetyl)glycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline (80 mg), 5-amino-1,3,4-thiadiazole-2-thiol (24 mg), potassium carbonate (42 mg) in dimethylformamide (2 ml) was stirred for 30 minutes at ambient temperature. To the mixture was added water, and the mixture was extracted with ethyl acetate twice. Combined organic layers were washed with water three times, dried over magnesium sulfate and concentrated. The residue was pulverized from diethyl ether to give 8-[3-[N-[2-(5-amino-1,3,4-thiadiazol-2-ylthio)acetyl)glycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline (25 mg) as a solid.

mp : >120°C

NMR (DMSO-d₆, δ) : 2.61 (3H, s), 3.14 (3H, s), 3.38 (1H, dd, J=18, 4Hz), 3.68 (1H, dd, J=18, 4Hz), 3.75 (2H, s), 5.47 (1H, d, J=9Hz), 5.55 (1H, d, J=9Hz), 7.30 (2H, s), 7.37-7.57 (4H, m), 7.77 (2H, s), 8.22 (1H, d, J=7.5Hz), 8.40 (1H, t, J=4.5Hz)

Example 16

The following compounds were obtained according to a similar manner to that of Example 15.

(1) 8-[3-[N-[2-(2-Benzoxazolylthio)acetyl)glycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline

NMR (DMSO-d₆, δ) : 2.59 (3H, s), 3.15 (3H, s), 3.43 (1H, dd, J=15, 4Hz), 3.71 (1H, dd, J=15, 4Hz), 4.20 (2H, s), 5.46 (1H, d, J=12Hz), 5.55 (1H, d, J=12Hz), 7.30-7.66 (8H, m), 7.77 (2H, s), 8.20 (1H, d, J=7.5Hz), 8.58 (1H, t, J=4Hz)

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- (2) 8-[3-[N-[2-(2-Benzimidazolylthio)acetylglucyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline
mp : >120°C
NMR (DMSO-d₆, δ) : 2.61 (3H, s), 3.13 (3H, s), 3.42 (1H, dd, J=15, 4Hz), 3.70 (1H, dd, J=15, 4Hz), 4.07 (2H, s), 5.46 (1H, d, J=15Hz), 5.53 (1H, d, J=15Hz), 7.09-7.16 (3H, m), 7.33-7.55 (5H, m), 7.75 (2H, s), 8.19 (1H, d, J=7.5Hz), 8.58 (1H, t, J=4Hz)
- (3) 8-[3-[N-[2-(2-Benzothiazolylthio)acetylglucyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline
mp : 174-175°C
NMR (DMSO-d₆, δ) : 2.60 (3H, s), 3.15 (3H, s), 3.45 (1H, dd, J=14, 4Hz), 3.72 (1H, dd, J=14, 4Hz), 4.22 (2H, s), 5.47 (1H, d, J=14Hz), 5.54 (1H, d, J=14Hz), 7.33-7.56 (6H, m), 7.76 (2H, s), 7.86 (1H, d, J=7.5Hz), 8.02 (1H, d, J=7.5Hz), 8.21 (1H, d, J=7.5Hz), 8.57 (1H, t, J=5Hz)
- (4) 8-[2,6-Dichloro-3-[N-[2-(6-ethoxybenzothiazol-2-ylthio)-acetylglucyl]-N-methylamino]benzyloxy]-2-methylquinoline
NMR (DMSO-d₆, δ) : 1.36 (3H, t, J=7.5Hz), 2.59 (3H, s), 3.14 (3H, s), 3.44 (1H, dd, J=15, 4Hz), 3.71 (1H, dd, J=15, 4Hz), 4.06 (2H, q, J=7.5Hz), 4.15 (2H, s), 5.46 (1H, d, J=15Hz), 5.53 (1H, d, J=15Hz), 7.05 (1H, dd, J=7.5, 2Hz), 7.34-7.70 (6H, m), 7.73 (2H, s), 8.21 (1H, d, J=7.5Hz), 8.54 (1H, t, J=4Hz)
- (5) 8-[3-[N-[2-(4-Aminophenylthio)acetylglucyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline
NMR (CDCl₃, δ) : 2.75 (3H, s), 3.26 (3H, s), 3.47 (2H, s), 3.51 (1H, dd, J=14, 4Hz), 3.80 (1H, dd, J=14, 4Hz), 5.62 (2H, s), 6.60 (2H, d, J=7.5Hz), 7.22-7.32 (5H, m), 7.39-7.49 (3H, m), 7.62 (1H, t, J=4Hz), 8.02 (1H, d, J=7.5Hz)

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Example 17

A mixture of 8-[3-[N-[2-(4-aminophenylthio)-acetyl]glycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline (56 mg), triethylamine (15 mg) and acetic anhydride (15 mg) in dichloromethane (2 ml) was stirred for 4 hours at ambient temperature. The resulting precipitates were collected by filtration to give 8-[3-[N-[2-(4-acetamidophenylthio)acetyl]glycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline (30 mg) as a colorless crystal.

mp : 179-180°C

NMR (DMSO-d₆, δ) : 2.04 (3H, s), 2.62 (3H, s), 3.16 (3H, s), 3.35 (1H, m), 3.66 (2H, s), 3.69 (1H, m), 5.49 (1H, d, J=14Hz), 5.57 (1H, d, J=14Hz), 7.28-7.59 (7H, m), 7.78 (2H, s), 8.20-8.35 (2H, m)

Example 18

To a suspension of 8-[3-(N-glycyl-N-methylamino)-2,6-dichlorobenzyloxy]-2-methylquinoline (100 mg) in tetrahydrofuran were added triethylamine (18.8 mg) and 4-methoxycarbonylphenyl chloroformate (39.8 mg) at 0°C under nitrogen atmosphere, and the mixture was stirred for 1 hour at the same temperature. The solvent was removed, and ethyl acetate and water were added to the residue. The organic layer was dried over magnesium sulfate and concentrated. The residue was purified by preparative thin-layer chromatography (ethyl acetate:n-hexane = 2:1, V/V) to give 8-[2,6-dichloro-3-[N-[(4-methoxycarbonylphenoxycarbonyl)glycyl]-N-methylamino]benzyloxy]-2-methylquinoline (30 mg) as an amorphous powder.

NMR (CDCl₃, δ) : 2.74 (3H, s), 3.26 (3H, s), 3.54 (1H, dd, J=4, 16Hz), 3.81 (1H, dd, J=4, 16Hz), 3.89 (3H, s), 5.65 (2H, s), 5.95 (1H, t-like), 7.19 (2H, d, J=8Hz), 7.22-7.35 (2H, m), 7.35-7.52 (4H, m), 7.97-8.08 (3H, m)

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Example 19

To a solution of 8-[3-(N-glycyl-N-methylamino)-2,6-dichlorobenzyloxy]-2-methylquinoline (80 mg) and triethylamine (40 mg) in dimethylformamide was added phenyl 2-benzothiazolylcarbamate (56.2 mg) under nitrogen atmosphere, and the mixture was stirred for 2 hours at 80°C. The reaction mixture was poured into water and extracted with ethyl acetate. The organic layer was washed with water and brine, dried over magnesium sulfate and evaporated in vacuo to give 8-[3-[N-[N'-(2-benzothiazolyl)ureidoacetyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline (85 mg) as a powder.

NMR (DMSO-d₆, δ) : 2.61 (3H, s), 3.17 (3H, s), 3.51 (1H, dd, J=4, 16Hz), 3.77 (1H, dd, J=4, 16Hz), 5.48 (1H, d, J=10Hz), 5.56 (1H, d, J=10Hz), 7.10 (1H, t-like), 7.21 (1H, t, J=8Hz), 7.31-7.66 (7H, m), 7.80 (2H, s-like), 7.88 (1H, d, J=8Hz), 8.21 (1H, d, J=8Hz)

Example 20

To a solution of methyl 2-aminoisonicotinate (500 mg) and triethylamine (549.6 μl) in dichloromethane (5 ml) was added phenyl chloroformate (433 μl) at 0°C under nitrogen atmosphere. After stirring for 2.5 hours at 0°C, the reaction mixture was concentrated. The residue was dissolved in dimethylformamide (13 ml), and 8-[3-(N-glycyl-N-methylamino)-2,6-dichlorobenzyloxy]-2-methylquinoline (1.33 g) and triethylamine (917 μl) were added thereto at ambient temperature under nitrogen atmosphere. The mixture was stirred for 91 hours, and chloroform was added thereto. The organic solution was washed with water, saturated sodium bicarbonate solution and brine and dried over magnesium sulfate. The solvent was removed, and the residue was crystallized from ethyl acetate to give 8-[2,6-dichloro-3-[N-[N'-(4-methoxycarbonylpyridin-2-yl)ureidoacetyl]-N-

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methylamino]benzyloxy]-2-methylquinoline (916 mg).

mp : 217-220°C

NMR (DMSO-d₆, δ) : 2.61 (3H, s), 3.16 (3H, s), 3.53 (1H, dd, J=16.5, 5.5Hz), 3.77 (1H, dd, J=16.5, 5.5Hz), 3.87 (3H, s), 5.48 (1H, d, J=10.0Hz), 5.55 (1H, d, J=10.0Hz), 7.33-7.58 (4H, m), 7.47 (1H, t, J=8.5Hz), 7.78 (1H, d, J=8.5Hz), 7.80 (1H, d, J=8.5Hz), 7.99 (1H, s), 8.11 (1H, m), 8.21 (1H, d, J=8.5Hz), 8.37 (1H, d, J=6.0Hz), 9.69 (1H, s)

its dihydrochloride

mp : 168-173°C

NMR (DMSO-d₆, δ) : 2.11 (3H, s), 2.92 (3H, s), 3.12 (3H, s), 3.66 (1H, dd, J=16.5, 4.5Hz), 3.86 (1H, dd, J=16.5, 4.5Hz), 5.57 (1H, d, J=11.5Hz), 5.61 (1H, d, J=11.5Hz), 6.88 (1H, d, J=8.5Hz), 7.46 (1H, d, J=8.5Hz), 7.66 (1H, t, J=8.5Hz), 7.73 (1H, d, J=8.5Hz), 7.77 (1H, d, J=8.5Hz), 7.83-8.00 (4H, m), 8.57 (1H, br s), 9.01 (1H, br d, J=8.5Hz), 9.48 (1H, br s)

Example 21

8-[3-[N-[N'-(6-Acetamidopyridin-2-yl)ureidoacetyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Example 20.

mp : 129-134°C

NMR (CDCl₃, δ) : 2.16 (3H, s), 2.71 (3H, s), 3.23 (3H, s), 3.72 (1H, dd, J=16.5, 4.5Hz), 3.93 (1H, dd, J=16.5, 4.5Hz), 5.56 (1H, d, J=10.0Hz), 5.61 (1H, d, J=10.0Hz), 6.40 (1H, d, J=8.5Hz), 7.22-7.34 (5H, m), 7.40-7.52 (3H, m), 7.70 (1H, d, J=8.5Hz), 7.90 (1H, br s), 8.03 (1H, d, J=8.5Hz), 8.90 (1H, s)

Example 22

(1) To a stirred solution of N,N'-carbonyldiimidazole (7.14

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g) in 1,4-dioxane (250 ml) was added 3-ethoxycarbonylaniline (7.28 g) at 0°C and the solution was stirred at ambient temperature for 15 hours and then at 40°C for 5 hours. To the mixture was added 8-[2,6-dichloro-3-(N-glycyl-N-methylamino)benzyloxy]-2-methylquinoline (14.84 g) at ambient temperature and the resulting mixture was heated at 100°C for 4 hours. After cooling, the mixture was concentrated in vacuo and the residue was purified by flash chromatography (methanol-chloroform) to afford N,N'-bis[[N-[2,4-dichloro-3-(2-methylquinolin-8-yloxymethyl)phenyl]-N-methylamino]-carbonylmethyl]urea (17.63 g).

NMR (CDCl₃, δ) : 2.71 (3H x 2, s), 3.19 (3H x 2, s), 3.44 (1H x 2, dd, J=15, 4Hz), 3.72 (1H x 2, dd, J=15, 5Hz), 5.45-5.78 (6H, m), 7.13-7.60 (12H, m), 8.00 (1H x 2, d, J=9Hz)

(2) A mixture of N,N'-bis[[N-[2,4-dichloro-3-(2-methylquinolin-8-yloxymethyl)phenyl]-N-methylamino]-carbonylmethyl]urea (16 g), 1N sodium hydroxide solution (40 ml) in dioxane (200 ml) was stirred for 4 hours at 80°C. The solvent was removed in vacuo, and water was added to the residue. The resulting precipitates were collected by filtration and washed with water to give 8-(2,6-dichloro-3-methylaminobenzyloxy)-2-methylquinoline (7.20 g) as a solid.

NMR (CDCl₃, δ) : 2.73 (3H, s), 2.90 (3H, d, J=6Hz), 4.50 (1H, q-like), 5.60 (2H, s), 6.61 (1H, d, J=8Hz), 7.20-7.32 (3H, m), 7.33-7.43 (2H, m), 8.00 (1H, d, J=8Hz)

(3) 8-[2,6-Dichloro-3-(N-methyl-N-phenoxy-carbonylamino)-benzyloxy]-2-methylquinoline was obtained by reacting 8-(2,6-dichloro-3-methylaminobenzyloxy)-2-methylquinoline with phenyl chloroformate according to a similar manner to that of Example 18.

NMR (CDCl₃, δ) : 2.71 (3H, s), 3.30 (3H, s), 5.64 (1H,

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d, J=10Hz), 5.70 (1H, d, J=10Hz), 7.00-7.06 (2H, m), 7.03-7.50 (9H, m), 8.00 (1H, d, J=8Hz)

5 (4) To a solution of bis(trichloromethyl)carbonate (232 mg), pyridine (273 mg) in dichloromethane was added 8-(2,6-dichloro-3-methylaminobenzyloxy)-2-methylquinoline (800 mg) at 0°C under nitrogen atmosphere, and the mixture was stirred for 1 hour at ambient temperature. To the mixture were added glycine ethyl ester hydrochloride (289 mg) and triethylamine 10 (582 mg), and the mixture was stirred for 3 hours at ambient temperature. The mixture was poured into water and extracted with dichloromethane. The organic layer was washed with water and brine, dried over magnesium sulfate and concentrated. The residue was purified by flash 15 chromatography (chloroform) to give 8-[2,6-dichloro-3-(N'-ethoxycarbonylmethyl-N-methylureido)benzyloxy]-2-methylquinoline (512 mg) as a powder.

20 NMR (CDCl₃, δ) : 1.24 (3H, t, J=7.5Hz), 2.73 (3H, s), 3.22 (3H, s), 3.85 (1H, brpeak), 4.04 (1H, brpeak), 4.16 (2H, q, J=7.5Hz), 4.80 (1H, t-like), 5.61 (2H, s), 7.21-7.35 (2H, m), 7.35-7.51 (4H, m), 8.03 (1H, d, J=8Hz)

Example 23

25 8-[2,6-Dichloro-3-[N'-(ethoxycarbonylmethyl)ureido]-benzyloxy]-2-methylquinoline was obtained from 8-(2,6-dichloro-3-aminobenzyloxy)-2-methylquinoline and glycine ethyl ester hydrochloride according to a similar manner to that of Example 22-(4).

30 NMR (CDCl₃, δ) : 1.06 (3H, t, J=7.5Hz), 2.21 (3H, s), 3.89-4.06 (4H, m), 5.36 (2H, s), 7.13 (1H, dd, J=8, 2Hz), 7.24-7.42 (3H, m), 7.56 (1H, t-like), 8.01 (1H, d, J=8Hz), 8.39 (1H, d, J=8Hz), 8.50 (1H, s)

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Example 24

The following compounds were obtained according to a similar manner to that of Example 3.

- 5 (1) 8-[3-[N-[4-(Carboxymethoxy)cinnamoylglycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline
mp : 286.6-290.6°C
NMR (DMSO-d₆, δ) : 2.60 (3H, s), 3.14 (3H, s), 3.49
10 (1H, dd, J=17, 4Hz), 3.79 (1H, dd, J=17, 5Hz), 4.44
(2H, s), 5.47 (1H, d, J=9Hz), 5.54 (1H, d, J=9Hz),
6.62 (1H, d, J=15Hz), 6.87 (2H, d, J=9Hz), 7.27-
7.58 (7H, m), 7.75 (1H, d, J=9Hz), 7.79 (1H, d,
J=9Hz), 8.16 (1H, m), 8.20 (1H, d, J=9Hz)
- 15 (2) 8-[3-[N-[(2-Carboxy-3-methylquinoline-6-carbonylglycyl)-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline
NMR (DMSO-d₆, δ) : 2.57 (3H, s), 2.61 (3H, s), 3.17
(3H, s), 3.63 (1H, dd, J=16, 5Hz), 3.92 (1H, dd,
J=16, 5Hz), 5.50 (2H, s), 7.33-7.66 (4H, m), 7.75-
20 7.88 (2H, m), 8.06-8.36 (3H, m), 8.36-8.55 (2H, m),
8.96 (1H, t-like)
- 25 (3) 8-[3-[N-[N'-(4-Carboxypyridin-2-yl)ureidoacetyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline
mp : 201-207°C
NMR (DMSO-d₆, δ) : 2.61 (3H, s), 3.16 (3H, s), 3.54
(1H, dd, J=16.5, 5.5Hz), 3.78 (1H, dd, J=16.5,
5.5Hz), 5.47 (1H, d, J=10.0Hz), 5.53 (1H, d,
J=10.0Hz), 7.30-7.58 (4H, m), 7.47 (1H, t, J=8.5Hz),
30 7.77 (1H, d, J=8.5Hz), 7.80 (1H, d, J=8.5Hz), 7.90
(1H, s), 8.21 (1H, d, J=8.5Hz), 8.30 (1H, m), 8.34
(1H, d, J=6.0Hz), 9.66 (1H, s)
- 35 (4) 8-[3-(N'-Carboxymethylureido)-2,6-dichlorobenzyloxy]-2-methylquinoline

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NMR (DMSO-d₆, δ) : 2.60 (3H, s), 3.86 (1H, d, J=6Hz),
5.42 (2H, s), 7.35-7.55 (6H, m), 8.20 (1H, d,
J=8Hz), 8.26 (1H, d, J=8Hz), 8.50 (1H, s)

- 5 (5) 8-[3-(N'-Carboxymethyl-N-methylureido)-2,6-
dichlorobenzyloxy]-2-methylquinoline
NMR (DMSO-d₆, δ) : 2.61 (3H, s), 3.10 (3H, s), 3.61
(2H, d, J=6Hz), 5.46 (2H, s), 6.46 (1H, br peak),
10 7.38-7.58 (5H, m), 7.67 (1H, d, J=8Hz), 8.21 (1H,
d, J=8Hz)

Example 25

The following compounds were obtained according to a
similar manner to that of Example 7.

- 15 (1) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(methylcarbamoyl-
methoxy)cinnamoylglycyl]amino]benzyloxy]-2-
methylquinoline (from 8-[3-[N-[4-(carboxymethoxy)-
cinnamoylglycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-
20 2-methylquinoline and methylamine hydrochloride)
NMR (CDCl₃, δ) : 2.74 (3H, s), 2.90 (3H, d, J=5Hz),
3.27 (3H, s), 3.65 (1H, dd, J=17, 4Hz), 3.94 (1H,
dd, J=17, 5Hz), 4.50 (2H, s), 5.63 (1H, d, J=9Hz),
5.66 (1H, d, J=9Hz), 6.36 (1H, d, J=15Hz), 6.55
25 (1H, br s), 6.61 (1H, br t, J=5Hz), 6.88 (2H, d,
J=9Hz), 7.22-7.34 (3H, m), 7.37-7.58 (6H, m), 8.02
(1H, d, J=9Hz)

its hydrochloride

- 30 NMR (DMSO-d₆, δ) : 2.90 (3H, s), 3.16 (3H, s), 3.29
(3H, s), 3.87 (1H, d, J=17Hz), 4.02 (1H, d,
J=17Hz), 4.50 (2H, s), 5.60 (1H, d, J=9Hz), 5.70
(1H, d, J=9Hz), 6.46 (1H, d, J=15Hz), 6.84-6.97
(2H, m), 7.36-7.67 (7H, m), 7.75-7.95 (4H, m), 8.88
35 (1H, br d, J=7.5Hz)

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(2) 8-[2,6-Dichloro-3-[N-methyl-N-[[2-(methylcarbamoyl)-3-methylquinoline-6-carbonyl]glycyl]amino]benzyloxy]-2-methylquinoline (from 8-[3-[N-[(2-carboxy-3-methylquinoline-6-carbonyl)glycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline and methylamine hydrochloride)

NMR (CDCl₃, δ) : 2.74 (3H, s), 2.88 (3H, s), 3.07 (3H, d, J=5Hz), 3.31 (3H, s), 3.79 (1H, dd J=4, 17Hz), 4.08 (1H, dd, J=5, 17Hz), 5.66 (2H, s), 7.23-7.48 (6H, m), 7.51 (1H, d, J=8Hz), 8.03 (1H, d, J=8Hz), 8.05-8.11 (2H, m), 8.19 (1H, q-like), 8.28 (1H, s-like)

its dihydrochloride

NMR (DMSO-d₆, δ) : 2.61 (3H, s), 2.85 (3H, d, J=5Hz), 2.90 (3H, s), 3.17 (3H, s), 3.70 (1H, dd, J=5, 16Hz), 2.98 (1H, dd, J=5, 16Hz), 5.60 (1H, d, J=10Hz), 5.66 (1H, d, J=10Hz), 7.78-7.98 (6H, m), 8.05-8.18 (2H, m), 8.33 (1H, s-like), 8.45 (1H, s-like), 8.70 (1H, q-like), 8.92-9.07 (2H, m)

(3) 8-[2,6-Dichloro-3-[N-[N'-[4-(dimethylcarbamoyl)pyridin-2-yl]ureidoacetyl]-N-methylamino]benzyloxy]-2-methylquinoline (from 8-[3-[N-[N'-(4-carboxypyridin-2-yl)ureidoacetyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline and dimethylamine hydrochloride)

mp : 118-123°C

NMR (DMSO-d₆, δ) : 2.60 (3H, s), 2.83 (3H, s), 2.97 (3H, s), 3.16 (3H, s), 3.53 (1H, dd, J=16.5, 5.5Hz), 3.78 (1H, dd, J=16.5, 5.5Hz), 5.47 (1H, d, J=10.0Hz), 5.53 (1H, d, J=10.0Hz), 6.91 (1H, d, J=5.5Hz), 7.30-7.58 (4H, m), 7.47 (1H, t, J=8.5Hz), 7.76 (1H, d, J=8.5Hz), 7.80 (1H, d, J=8.5Hz), 8.21 (1H, d, J=8.5Hz), 8.26 (1H, d, J=5.5Hz), 8.32 (1H, m), 9.59 (1H, s)

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its dihydrochloride

mp : 166-173°C

5 NMR (DMSO-d₆, δ) : 2.85 (3H, s), 2.93 (3H, s), 2.97 (3H, s), 3.13 (3H, s), 3.60 (1H, dd, J=16.5, 5.5Hz), 3.82 (1H, dd, J=16.5, 5.5Hz), 5.61 (2H, s), 6.96 (1H, d, J=6.0Hz), 7.33 (1H, s), 7.78-7.99 (6H, m), 8.23 (1H, d, J=6.0Hz), 8.29 (1H, m), 9.00 (1H, br d, J=8.5Hz), 9.87 (1H, s)

10 (4) 8-[2,6-Dichloro-3-[N'-(phenylcarbamoylmethyl)-ureido]benzyloxy]-2-methylquinoline (from 8-[3-(N'-carboxymethylureido)-2,6-dichlorobenzyloxy]-2-methylquinoline and aniline)

15 NMR (DMSO-d₆, δ) : 2.60 (3H, s), 4.01 (1H, d, J=6Hz), 5.44 (2H, s), 7.05 (1H, t, J=8Hz), 7.27-7.55 (9H, m), 7.61 (2H, d, J=8Hz), 8.21 (1H, d, J=8Hz), 8.28 (1H, d, J=8Hz), 8.58 (1H, s)

20 (5) 8-[2,6-Dichloro-3-[N'-(phenylcarbamoylmethyl)-N-methylureido]benzyloxy]-2-methylquinoline (from 8-[3-(N'-carboxymethyl-N-methylureido)-2,6-dichlorobenzyloxy]-2-methylquinoline and aniline)

25 NMR (CDCl₃, δ) : 2.50 (3H, s), 3.27 (3H, s), 5.59 (2H, s), 6.08 (1H, t-like), 6.83-6.98 (3H, m), 7.10 (1H, d, J=8Hz), 7.20-7.30 (3H, m), 7.38-7.55 (4H, m), 7.91 (1H, d, J=8Hz), 8.46 (1H, s)

30 (6) 8-[3-[N'-(Benzylcarbamoylmethyl)-N-methylureido]-2,6-dichlorobenzyloxy]-2-methylquinoline (from 8-[3-(N'-carboxymethyl-N-methylureido)-2,6-dichlorobenzyloxy]-2-methylquinoline and benzylamine)

35 NMR (CDCl₃, δ) : 2.65 (3H, s), 3.20 (3H, s), 3.70-4.48 (4H, brpeak), 5.41-5.60 (2H, brpeak), 5.65 (1H, t-like), 6.65 (1H, brpeak), 6.97-7.13 (4H, m), 7.20-7.35 (4H, m), 7.42-7.50 (3H, m), 8.05 (1H, d,

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J=8Hz)

Example 26

To a mixture of 8-[2,6-dichloro-3-[N-methyl-N-[(E)-3-(6-methylaminopyridin-3-yl)acryloylglycyl]amino]benzyloxy]-2-methylquinoline (100 mg) and triethylamine (23.3 mg) in dichloromethane was added acetyl chloride (15.3 mg) under nitrogen in ice water bath and the mixture was stirred for 3 hours at same temperature. The reaction mixture was poured into water and extracted with ethyl acetate. The organic layer was washed with water, saturated sodium bicarbonate solution and brine, dried over magnesium sulfate and evaporated in vacuo. The residue was purified by preparative thin-layer chromatography (dichloromethane:methanol = 20:1, V/V) to give 8-[2,6-dichloro-3-[N-methyl-N-[(E)-3-[6-(N-methylacetamido)pyridin-3-yl)acryloylglycyl]amino]benzyloxy]-2-methylquinoline (50 mg) as an amorphous powder.

NMR (CDCl₃, δ): 2.17 (3H, s), 2.71 (3H, s), 3.29 (3H, s), 3.41 (3H, s), 3.70 (1H, dd, J=4, 16Hz), 3.95 (1H, dd, J=4, 16Hz), 5.60-5.69 (2H, m), 6.52 (1H, d, J=16Hz), 6.72 (1H, t-like), 7.22-7.52 (7H, m), 7.56 (1H, d, J=16Hz), 7.83 (1H, dd, J=2, 8Hz), 8.03 (1H, d, J=8Hz), 8.54 (1H, d, J=2Hz)

its dihydrochloride

NMR (DMSO-d₆, δ): 2.10 (3H, s), 2.88 (3H, s), 3.13 (3H, s), 3.31 (3H, s), 3.89 (1H, dd, J=4, 16Hz), 5.56-5.70 (2H, m), 6.87 (1H, d, J=16Hz), 7.42 (1H, d, J=16Hz), 7.61 (1H, d, J=8Hz), 7.66-7.97 (6H, m), 8.03 (1H, d, J=8Hz), 8.35 (1H, t-like), 8.61 (1H, d, J=2Hz), 8.91 (1H, brpeak)

Example 27

(1) A solution of 8-hydroxy-2-methylquinoline (737 mg) in dimethylformamide was dropwise added to a solution of sodium

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hydride (60% in oil, 185 mg) in dimethylformamide under ice-bath cooling, and the mixture was stirred for 1 hour at the same temperature. To the mixture was added 2,6-dichloro-1-methylsulfonyloxymethyl-3-(methoxymethoxy)benzene (1.46 g) under ice-bath cooling, and the mixture was stirred for 1 hour at the same temperature. The reaction mixture was poured into water and extracted with ethyl acetate. The organic layer was washed with water and brine, dried over magnesium sulfate and evaporated in vacuo. The residue was purified by silica gel column chromatography (ethyl acetate - n-hexane) to give 8-[2,6-dichloro-3-(methoxymethoxy)-benzyloxy]-2-methylquinoline as an oil.

NMR (CDCl₃, δ): 2.75 (3H, s), 3.53 (3H, s), 5.26 (2H, s), 5.63 (2H, s), 7.15 (1H, d, J=8Hz), 7.23-7.45 (5H, m), 8.00 (1H, d, J=8Hz)

(2) To a solution of 8-[2,6-dichloro-3-(methoxymethoxy)benzyloxy]-2-methylquinoline (1.57 g) in methanol was dropwise added conc. hydrochloric acid (2.7 ml) at 0°C, and the mixture was stirred for 5 minutes. The solvent was removed, and water was added thereto. The mixture was neutralized with saturated sodium bicarbonate solution, and the resulting precipitates were collected by filtration to give 8-(2,6-dichloro-3-hydroxybenzyloxy)-2-methylquinoline (734 mg) as a solid.

NMR (DMSO-d₆, δ): 2.73 (3H, s), 5.44 (2H, s), 7.10 (1H, d, J=8Hz), 7.34 (1H, d, J=8Hz), 7.53-7.76 (4H, m), 8.48-8.64 (1H, brpeak)

(3) 8-[2,6-Dichloro-3-(2-phthalimidoethoxy)benzyloxy]-2-methylquinoline was obtained by reacting 8-(2,6-dichloro-3-hydroxybenzyloxy)-2-methylquinoline with 2-phthalimidoethyl bromide according to a similar manner to that of Preparation 27-(4).

NMR (CDCl₃, δ): 2.70 (3H, s), 4.16 (2H, t, J=5Hz),

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4.28 (2H, t, J=5Hz), 5.55 (2H, s), 6.95 (1H, d, J=8Hz), 7.20 (1H, dd, J=2, 8Hz), 7.23-7.31 (2H, m), 7.31-7.43 (2H, m), 7.67-7.76 (2H, m), 7.79-7.91 (2H, m), 7.99 (1H, d, J=8Hz)

5

(4) 8-[3-(2-Aminoethoxy)-2,6-dichlorobenzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Preparation 11.

10 NMR (CDCl₃, δ) : 2.72 (3H, s), 3.17 (2H, t, J=5Hz), 4.08 (2H, t, J=5Hz), 5.60 (2H, s), 5.90 (1H, d, J=8Hz), 7.20-7.30 (3H, m), 7.30-7.46 (2H, m), 8.03 (1H, d, J=8Hz)

15 (5) To a solution of 8-[3-(2-aminoethoxy)-2,6-dichlorobenzyloxy]-2-methylquinoline (11 mg) in dichloromethane were added pyridine (3.46 g) and acetic anhydride (4.47 mg), and the mixture was stirred for 30 minutes. The mixture was concentrated, and the residue was purified by preparative thin-layer chromatography (dichloromethane:methanol = 10:1, V/V) to give 8-[3-(2-acetamidoethoxy)-2,6-dichlorobenzyloxy]-2-methylquinoline (6 mg) as an amorphous powder.

20 NMR (CDCl₃, δ) : 1.97 (3H, s), 2.71 (3H, s), 3.61 (2H, q, J=5Hz), 4.10 (2H, t, J=5Hz), 5.56 (2H, s), 6.83 (1H, d, J=8Hz), 6.99 (1H, t-like), 7.20-7.28 (2H, m), 7.31 (1H, d, J=8Hz), 7.41 (2.2H, d-like), 8.04 (1H, d, J=8Hz)

25

30 (6) 8-[2,6-Dichloro-3-[2-[4-(methylcarbamoyl)cinnamamido]-ethoxy]benzyloxy]-2-methylquinoline was obtained from 8-[3-(2-aminoethoxy)-2,6-dichlorobenzyloxy]-2-methylquinoline and 4-(methylcarbamoyl)cinnamic acid according to a similar manner to that of Example 1.

35 NMR (CDCl₃, δ) : 2.42 (3H, s), 2.78 (3H, d, J=5Hz), 3.75 (2H, q, J=5Hz), 4.14 (2H, t, J=5Hz), 5.49 (2H,

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s), 6.66 (1H, d, J=8Hz), 6.72 (1H, d, J=16Hz), 6.99 (1H, d, J=8Hz), 7.21-7.29 (1H, m), 7.35-7.51 (4H, m), 7.55 (1H, d, J=16Hz), 7.77 (2H, d, J=8Hz), 7.97 (1H, q-like), 8.00-8.07 (2H, m)

5

Example 28

(1) 8-[2,6-Dichloro-3-[N-ethoxycarbonylmethyl-N-(phthalimidoacetyl)amino]benzyloxy]-2-methylquinoline was obtained by reacting 8-[2,6-dichloro-3-(phthalimidoacetyl-amino)benzyloxy]-2-methylquinoline with ethyl bromoacetate according to a similar manner to that of Preparation 10.

10

mp : 211-213°C

NMR (CDCl₃, δ) : 1.28 (3H, t, J=7.5Hz), 2.73 (3H, s), 3.68 (1H, d, J=17Hz), 4.03 (1H, d, J=17Hz), 4.13-4.30 (3H), 5.00 (1H, d, J=17Hz), 5.65 (1H, d, J=10Hz), 5.70 (1H, d, J=10Hz), 7.23-7.31 (2H), 7.36-7.49 (3H), 7.69-7.75 (2H), 7.81-7.91 (3H), 8.01 (1H, d, J=8Hz)

15

(2) To the solution of 8-[2,6-dichloro-3-[N-ethoxycarbonylmethyl-N-(phthalimidoacetyl)amino]benzyloxy]-2-methylquinoline (527 mg) in dichloromethane (5.3 ml) was added 30% solution of methylamine in methanol (2 ml) at ambient temperature. After stirring for 24 hours, the reaction mixture was evaporated in vacuo. The residue was purified by flash column chromatography (silica gel 50 ml) eluting with dichloromethane:methanol (20:1, V/V) and by crystallizing from isopropyl ether to give 8-[2,6-dichloro-3-(2,5-dioxopiperazin-1-yl)benzyloxy]-2-methylquinoline (187 mg) as colorless crystals.

25

30

mp : 211-213°C

NMR (CDCl₃, δ) : 2.74 (3H, s), 4.09-4.21 (3H), 4.40 (1H, d, J=17Hz), 5.62 (2H, s), 6.38 (1H, br s), 7.21-7.51 (6H), 8.01 (1H, d, J=8Hz)

35

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5 (3) 8-[2,6-Dichloro-3-(4-ethoxycarbonylmethyl-2,5-dioxopiperazin-1-yl)benzyloxy]-2-methylquinoline was obtained by reacting 8-[2,6-dichloro-3-(2,5-dioxopiperazin-1-yl)benzyloxy]-2-methylquinoline with ethyl bromoacetate according to a similar manner to that of Preparation 10.

10 NMR (CDCl₃, δ) : 1.31 (3H, t, J=7.5Hz), 2.74 (3H, s), 4.11-4.36 (7H), 4.48 (1H, d, J=17Hz), 5.61 (2H, s), 7.21-7.32 (3H), 7.36-7.51 (3H), 8.02 (1H, d, J=8Hz)

15 (4) 8-[2,6-Dichloro-3-(4-carboxymethyl-2,5-dioxopiperazin-1-yl)benzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Example 3.

15 NMR (DMSO-d₆, δ) : 2.61 (3H, s), 4.00-4.37 (5H, m), 4.50 (1H, d, J=16Hz), 5.46 (2H, s), 7.37-7.56 (4H, m), 7.69 (1H, d, J=8Hz), 7.74 (1H, d, J=8Hz), 8.21 (1H, d, J=8Hz)

20 (5) 8-[2,6-Dichloro-3-[4-[4-(methylcarbamoyl)-phenylcarbamoylmethyl]-2,5-dioxopiperazin-1-yl]benzyloxy]-2-methylquinoline was obtained from 8-[2,6-dichloro-3-(4-carboxymethyl-2,5-dioxopiperazin-1-yl)benzyloxy]-2-methylquinoline and 4-amino-N-methylbenzamide according to a similar manner to that of Example 7.

25 NMR (CDCl₃-CD₃OD, δ) : 2.62 (3H, s), 3.89 (3H, s), 4.07 (1H, d, J=16Hz), 4.18 (1H, d, J=16Hz), 4.27-4.41 (4H, m), 5.50 (2H, s), 7.19-7.30 (4H, m), 7.37-7.44 (3H, m), 7.56 (2H, d, J=8Hz), 7.70 (2H, d, J=8Hz), 8.02 (1H, d, J=8Hz)

Preparation 33

35 The following compounds were obtained according to a similar manner to that of Preparation 12.

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- (1) 8-Hydroxy-2-methyl-4-(2,2,2-trifluoroethoxy)quinoline
mp : 117-119°C
NMR (CDCl₃, δ) : 2.69 (3H, s), 4.56 (2H, q, J=7.5Hz),
6.60 (1H, s), 7.17 (1H, d, J=8Hz), 7.38 (1H, t,
J=8Hz), 7.60 (1H, d, J=8Hz)

- (2) 8-Hydroxy-4-propoxy-2-methylquinoline
mp : 60-62°C
NMR (CDCl₃, δ) : 1.13 (3H, t, J=7.5Hz), 1.89-2.03 (2H,
m), 2.65 (3H, s), 4.12 (2H, t, J=8Hz), 6.61 (1H,
s), 7.11 (1H, d, J=8Hz), 7.30 (1H, t, J=8Hz), 7.60
(1H, d, J=8Hz)

Example 29

The following compounds were obtained according to a similar manner to that of Example 9.

- (1) 8-[3-[N-[(E)-3-(6-Acetylamino)pyridin-3-yl)acryloyl]glycyl]-N-methylamino]-2,6-dichloro-
benzyloxy]-4-dimethylamino-2-methylquinoline
NMR (CDCl₃, δ) : 2.21 (3H, s), 2.72 (3H, br s), 3.11
(6H, br s), 3.26 (3H, s), 3.76 (1H, br d, J=17Hz),
4.00 (1H, dd, J=17.5Hz), 5.59 (2H, s), 6.53 (1H, br
d, J=15Hz), 6.67 (1H, s), 7.21-7.52 (5H, m), 7.70
(1H, d, J=8Hz), 7.78 (1H, br d, J=8Hz), 8.10 (1H,
br d, J=8Hz), 8.20 (1H, s), 8.31 (1H, s)

its trihydrochloride

- NMR (CDCl₃-CD₃OD, δ) : 2.44 (3H, s), 2.77 (3H, br s),
3.27 (3H, s), 3.51 (6H, s), 3.85 (1H, d, J=17Hz),
4.42 (1H, d, J=17Hz), 5.42 (1H, d, J=10Hz), 5.62
(1H, d, J=10Hz), 6.75 (1H, br s), 6.94 (1H, br d,
J=15Hz), 7.27 (1H, br d, J=15Hz), 7.43 (1H, d,
J=8Hz), 7.50-7.68 (3H, m), 7.82 (1H, d, J=8Hz),
8.14 (1H, br d, J=8Hz), 8.35 (1H, br d, J=8Hz),

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8.90 (1H, br s)

- 5 (2) 8-[3-[N-[(E)-3-(6-Acetylamino-2-methylquinolin-3-yl)acryloyl-glycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-4-ethoxy-2-methylquinoline

10 NMR (CDCl₃, δ) : 1.55 (3H, br t, J=7.5Hz), 2.20 (3H, s), 2.66 (3H, s), 3.25 (3H, s), 3.66 (1H, dd, J=17, 4Hz), 3.93 (1H, dd, J=17, 5Hz), 4.16-4.29 (2H, m), 5.59 (2H, br s), 6.47 (1H, d, J=15Hz), 6.61 (1H, s), 6.73 (1H, br s), 7.19-7.55 (5H, m), 7.76-7.89 (2H, m), 8.08-8.21 (2H, m), 8.32 (1H, br s)

its dihydrochloride

15 NMR (CDCl₃-CD₃OD, δ) : 1.63-1.72 (3H, m), 2.42 (3H, s), 3.02 (3H, br s), 3.28 (3H, s), 3.89 (1H, d, J=17Hz), 4.29 (1H, d, J=17Hz), 4.56-4.66 (2H, m), 5.48 (1H, d, J=10Hz), 5.67 (1H, d, J=10Hz), 6.92 (1H, br d, J=15Hz), 7.16-7.63 (5H, m), 7.72 (1H, t, J=8Hz), 7.98 (1H, d, J=8Hz), 8.10-8.16 (1H, m), 8.44-8.51 (1H, m), 8.84-8.92 (1H, m)

20

- 25 (3) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)-cinnamoylglycyl]amino]benzyloxy]-2-methyl-4-(2,2,2-trifluoroethoxy)quinoline

30 NMR (CDCl₃, δ) : 2.69 (3H, s), 3.01 (3H, d, J=5Hz), 3.25 (3H, s), 3.63 (1H, dd, J=4, 18Hz), 3.92 (1H, dd, J=4, 18Hz), 4.55 (2H, q, J=8Hz), 5.60 (1H, d, J=10Hz), 5.65 (1H, d, J=10Hz), 6.23 (1H, q-like), 6.53 (1H, d, J=16Hz), 6.62 (1H, s-like), 6.70 (1H, t-like), 7.27-7.35 (2H, m), 7.39-7.63 (5H, m), 7.75 (2H, d, J=8Hz), 7.85 (1H, d, J=8Hz)

its hydrochloride

35 NMR (DMSO-d₆, δ) : 2.79 (3H, d, J=3Hz), 2.88 (3H, s), 3.13 (3H, s), 3.60 (1H, dd, J=5, 16Hz), 5.36 (2H,

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q, J=8Hz), 5.60 (1H, d, J=10Hz), 5.66 (1H, d, J=10Hz), 6.88 (1H, d, J=16Hz), 7.41 (1H, d, J=16Hz), 7.55-7.67 (2H, m), 7.73 (1H, s-like), 7.80-8.01 (7H, m), 8.38 (1H, t-like), 8.51 (1H, q-like)

(4) 8-[3-[N-[(E)-3-(6-Acetylaminopyridin-3-yl)acryloyl-glycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methyl-4-(2,2,2-trifluoroethoxy)quinoline

NMR (CDCl₃, δ) : 2.21 (3H, s), 2.70 (3H, s), 3.26 (3H, s), 3.65 (1H, dd, J=17 and 4Hz), 3.94 (1H, dd, J=17 and 5Hz), 4.55 (1H, q, J=7.5Hz), 5.59 (1H, d, J=9Hz), 5.64 (1H, d, J=9Hz), 6.45 (1H, d, J=15Hz), 6.61 (1H, s), 6.71 (1H, br t, J=4Hz), 7.29 (1H, d, J=9Hz), 7.30 (1H, d, J=8Hz), 7.42 (1H, d, J=9Hz), 7.48 (1H, t, J=8Hz), 7.52 (1H, d, J=15Hz), 7.81 (1H, dd, J=9 and 1Hz), 7.85 (1H, d, J=9Hz), 8.14 (1H, br s), 8.20 (1H, d, J=9Hz), 8.35 (1H, d, J=1Hz)

its dihydrochloride

NMR (CDCl₃-CD₃OD, δ) : 2.41 (3H, s), 3.09 (3H, br s), 3.28 (3H, s), 3.92 (1H, d, J=17Hz), 4.15 (1H, d, J=17Hz), 5.10 (2H, br q, J=9Hz), 5.49 (1H, d, J=9Hz), 5.68 (1H, d, J=9Hz), 6.89 (1H, br d, J=15Hz), 7.41 (1H, d, J=15Hz), 7.53-7.64 (3H, m), 7.70-7.84 (2H, m), 7.99 (1H, d, J=9Hz), 8.04 (1H, d, J=8Hz), 8.59 (1H, br d, J=8Hz), 8.88 (1H, br s)

(5) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)-cinnamoylglycyl]amino]benzyloxy]-4-propoxy-2-methylquinoline

NMR (CDCl₃, δ) : 1.13 (3H, t, J=7.5Hz), 1.91-2.02 (2H, m), 2.66 (3H, br s), 3.00 (3H, d, J=5Hz), 3.25 (3H, s), 3.64 (1H, dd, J=17, 4Hz), 3.93 (1H, dd, J=17,

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5 Hz), 4.13 (2H, br t, J=7.5Hz), 5.60 (1H, d, J=10Hz), 5.65 (1H, d, J=10Hz), 6.33 (1H, br d, J=5Hz), 6.53 (1H, d, J=15Hz), 6.63 (1H, s), 6.72 (1H, br s), 7.22-7.32 (2H, m), 7.37 (1H, br t, J=8Hz), 7.47 (1H, d, J=8Hz), 7.51 (2H, d, J=8Hz), 7.58 (1H, d, J=15Hz), 7.75 (2H, d, J=8Hz), 7.88 (1H, d, J=8Hz)

its hydrochloride

10 NMR (CDCl₃-CD₃OD, δ) : 1.18 (3H, t, J=7.5Hz), 2.00-2.13 (2H, m), 2.98 (3H, s), 3.00 (3H, s), 3.29 (3H, s), 3.88 (1H, d, J=17Hz), 4.15 (1H, d, J=17Hz), 4.49 (2H, br t, J=7.5Hz), 5.51 (1H, d, J=10Hz), 5.68 (1H, d, J=10Hz), 6.65 (1H, d, J=15Hz), 7.26 (1H, br s), 7.39 (1H, d, J=15Hz), 7.48-7.60 (5H, m), 7.69-7.81 (3H, m), 7.97 (1H, br d, J=8Hz)

(6) 8-[3-[N-[(E)-3-(6-Acetylamino-2-pyridyl)acryloyl-glycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-4-propoxy-2-methylquinoline

20 NMR (CDCl₃, δ) : 1.15 (3H, t, J=7.5Hz), 1.91-2.02 (2H, m), 2.21 (3H, s), 2.68 (3H, s), 3.28 (3H, s), 3.67 (1H, dd, J=17, 4Hz), 3.96 (1H, dd, J=17, 5Hz), 4.13 (2H, br t, J=7.5Hz), 5.61 (1H, d, J=10Hz), 5.68 (1H, d, J=10Hz), 6.48 (1H, d, J=15Hz), 6.63 (1H, s), 6.73 (1H, br s), 7.21-7.40 (3H, m), 7.45-7.58 (2H, m), 7.79-7.90 (2H, m), 8.12-8.23 (2H, m), 8.34 (1H, br s)

30 its dihydrochloride

35 NMR (CDCl₃-CD₃OD, δ) : 1.18 (3H, t, J=7.5Hz), 2.00-2.13 (2H, m), 2.42 (3H, s), 3.00 (3H, br s), 3.28 (3H, s), 3.88 (1H, d, J=17Hz), 4.29 (1H, d, J=17Hz), 4.49 (2H, br t, J=7.5Hz), 5.47 (1H, d, J=10Hz), 5.66 (1H, d, J=10Hz), 6.90 (1H, br d,

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J=15Hz), 7.25 (1H, br s), 7.36 (1H, br d, J=15Hz), 7.50-7.64 (3H, m), 7.73 (1H, t, J=8Hz), 7.97 (1H, d, J=8Hz), 8.13 (1H, br d, J=8Hz), 8.48 (1H, br d, J=8Hz), 8.90 (1H, br s)

5

(7) 8-[3-[N-[(E)-3-(6-Acetamidopyridin-3-yl)acryloylglycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-4-isopropoxy-2-methylquinoline

NMR (DMSO-d₆, δ) : 2.19 (3H, s), 2.66 (3H, s), 3.26 (3H, s), 3.69 (1H, dd, J=4, 18Hz), 3.95 (1H, dd, J=4, 18Hz), 4.80 (1H, m), 5.50-5.65 (2H, m), 6.46 (1H, d, J=16Hz), 6.61 (1H, s-like), 6.96 (1H, brpeak), 7.17-7.58 (5H, m), 7.72-7.90 (2H, m), 8.16 (1H, d, J=8Hz), 8.30 (1H, s-like), 8.60 (1H, brpeak)

15

its dihydrochloride

NMR (DMSO-d₆, δ) : 1.49 (6H, d, J=7Hz), 2.11 (3H, s), 2.85 (3H, s), 3.14 (3H, s), 3.59 (1H, dd, J=4, 16Hz), 3.90 (1H, dd, J=4, 16Hz), 5.24 (1H, m), 5.60 (1H, d, J=10Hz), 5.66 (1H, d, J=10Hz), 6.79 (1H, d, J=16Hz), 7.37 (1H, d, J=16Hz), 7.60 (1H, s-like), 7.75-8.05 (7H, m), 8.11 (1H, d, J=8Hz), 8.31 (1H, t-like), 8.48 (1H, d-like)

25

(8) 8-[3-[N-[(E)-3-(6-Acetamidopyridin-3-yl)acryloylglycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-4-(2-methoxyethoxy)-2-methylquinoline

NMR (CDCl₃, δ) : 2.21 (3H, s), 2.67 (3H, s), 3.25 (3H, s), 3.50 (3H, s), 3.65 (1H, dd, J=4, 18Hz), 3.85-4.02 (3H, m), 4.32 (2H, t, J=5Hz), 5.62 (2H, s-like), 6.47 (1H, d, J=16Hz), 6.65 (1H, s-like), 6.71 (1H, brpeak), 7.19-7.41 (3H, m), 7.41-7.57 (2H, m), 7.78-7.92 (2H, m), 8.07 (1H, s-like), 8.19 (1H, d, J=8Hz), 8.34 (1H, d, J=2Hz)

30

35

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its dihydrochloride

NMR (DMSO-d₆, δ) : 2.10 (3H, s), 2.85 (3H, s), 3.14 (3H, s), 3.37 (3H, s), 3.59 (1H, dd, J=4, 16Hz), 3.84-3.96 (3H, m), 4.61-4.68 (2H, m), 5.60 (1H, d, J=10Hz), 5.66 (1H, d, J=10Hz), 6.79 (1H, d, J=16Hz), 7.37 (1H, d, J=16Hz), 7.60 (1H, s-like), 7.78-8.03 (7H, m), 8.11 (1H, d, J=8Hz), 8.31 (1H, t-like), 8.47 (1H, d, J=2Hz)

10 Example 30

(1) Methyl (E)-3-(indol-5-yl)acrylate was obtained by reacting indole-5-carbaldehyde with methyl (triphenylphosphoranilidene)acetate according to a similar manner to that of Preparation 1.

15 mp : 139.6-142.2°C

NMR (CDCl₃, δ) : 3.80 (3H, s), 6.44 (1H, d, J=15Hz), 6.59 (1H, d-like), 7.20-7.27 (2H, m), 7.33-7.46 (2H, m), 7.75-7.88 (2H, m), 8.27 (1H, brpeak)

20 (2) (E)-3-(Indol-5-yl)acrylic acid was obtained according to a similar manner to that of Preparation 3.

mp : >185°C (dec.)

NMR (DMSO-d₆, δ) : 6.39 (1H, d, J=16Hz), 6.49 (1H, t-like), 7.36-7.50 (3H, m), 7.69 (1H, d, J=16Hz), 7.83 (1H, s-like)

25 (3) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-(indol-5-yl)-acryloyl]glycyl]amino]benzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Example 1.

30 NMR (CDCl₃, δ) : 2.71 (3H, s), 3.22 (3H, s), 3.62 (1H, dd, J=4, 18Hz), 3.93 (1H, dd, J=4, 18Hz), 5.63 (2H, s-like), 6.43 (1H, d, J=16Hz), 6.50-6.59 (2H, m), 7.17-7.22 (1H, m), 7.22-7.50 (8H, m), 7.70 (1H, d, J=16Hz), 7.76 (1H, s-like), 8.03 (1H, d, J=8Hz),

35

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8.55 (1H, br s)

its dihydrochloride

5 NMR (DMSO-d₆, δ) : 2.90 (3H, s), 3.15 (3H, s), 3.59 (1H, dd, J=4, 16Hz), 3.88 (1H, dd, J=4, 16Hz), 5.54-5.69 (2H, m), 6.47 (1H, s-like), 6.66 (1H, d, J=16Hz), 7.29-7.52 (4H, m), 7.71 (1H, s-like), 7.76-8.02 (6H, m), 8.19 (1H, t-like), 8.95 (1H, brpeak)

10

Example 31

(1) 4-Acetamido-3-methylcinnamic acid was obtained by reacting 4-acetamido-3-methylbenzaldehyde with malonic acid according to a similar manner to that of Preparation 4.

15

mp : 262-263°C (dec.)

NMR (DMSO-d₆, δ) : 2.09 (3H, s), 2.23 (3H, s), 6.43 (1H, d, J=16Hz), 7.43-7.61 (4H), 9.33 (1H, s)

20

(2) 8-[3-[N-(4-Acetamido-3-methylcinnamoyl)glycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Example 1.

25 NMR (CDCl₃, δ) : 2.22 (3H, s), 2.27 (3H, s), 2.73 (3H, s), 3.25 (3H, s), 3.63 (1H, dd, J=18, 4Hz), 3.94 (1H, dd, J=18, 4Hz), 5.64 (2H, s), 6.41 (1H, d, J=16Hz), 6.62 (1H, br s), 7.05 (1H, br s), 7.22-7.55 (9H), 7.89-8.06 (2H)

30

its hydrochloride

35 NMR (DMSO-d₆, δ) : 2.09 (3H, s), 2.22 (3H, s), 2.91 (3H, s), 3.15 (3H, s), 3.59 (1H, dd, J=18, 4Hz), 3.89 (1H, dd, J=18, 4Hz), 5.64 (2H, s), 6.72 (1H, d, J=16Hz), 7.26-8.00 (10H), 8.28 (1H, t, J=4Hz), 8.97 (1H, br s), 9.38 (1H, s)

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Example 32

- (1) (E)-3-(6-Ethoxypyridin-3-yl)acrylic acid was obtained by reacting 6-ethoxypyridine-3-carbaldehyde with malonic acid according to a similar manner to that of Preparation 4.

mp : 171-172°C

NMR (CDCl₃-CD₃OD, δ) : 1.40 (3H, t, J=6Hz), 4.37 (2H, q, J=6Hz), 6.36 (1H, d, J=16Hz), 6.80 (1H, d, J=8Hz), 7.63 (1H, d, J=16Hz), 7.89 (1H, dd, J=8, 1Hz), 8.23 (1H, d, J=1Hz)

- (2) 8-[2,6-Dichloro-3-[N-[(E)-3-(6-ethoxypyridin-3-yl)acryloylglycyl]-N-methylamino]benzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Example 1.

NMR (CDCl₃, δ) : 1.40 (3H, t, J=6Hz), 2.73 (3H, s), 3.27 (3H, s), 3.65 (1H, dd, J=16, 4Hz), 3.94 (1H, dd, J=16, 4Hz), 4.38 (2H, q, J=6Hz), 5.66 (2H, s), 6.38 (1H, d, J=16Hz), 6.62 (1H, t, J=4Hz), 6.72 (1H, d, J=8Hz), 7.23-7.56 (7H), 7.73 (1H, dd, J=8, 2Hz), 8.03 (1H, d, J=8Hz), 8.23 (1H, s)

its dihydrochloride

NMR (DMSO-d₆, δ) : 1.33 (3H, t, J=6Hz), 2.92 (3H, s), 3.16 (3H, s), 3.58 (1H, dd, J=16, 4Hz), 3.89 (1H, dd, J=16, 4Hz), 4.33 (2H, q, J=6Hz), 5.65 (2H, s), 6.73 (1H, d, J=16Hz), 6.87 (1H, d, J=8Hz), 7.32-7.99 (8H), 8.23-8.36 (2H), 8.98 (1H, br s)

Example 33

- (1) To a solution of 2,6-dimethylbenzoic acid (20 g) in conc. sulfuric acid (100 ml) was dropwise added under ice-cooling a mixture of 70% nitric acid and conc. sulfuric acid (21.6 ml), which was prepared by dropwise adding conc.

sulfuric acid (10.8 ml) to 70% nitric acid (15.1 ml) under

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ice-cooling, and the mixture was stirred for 1 hour at the same temperature. Ice-water was added to the reaction mixture, and the resulting precipitates were filtered off. The filtrate was concentrated, and the residue was purified by flash chromatography (dichloromethane : methanol = 20 : 1 including 1% acetic acid) to give 2,6-dimethyl-3-nitrobenzoic acid (7.0 g) as a colorless crystal.

mp : 109-112°C

NMR (CDCl₃, δ) : 2.48 (3H, s), 2.57 (2H, s), 7.22 (1H, d, J=8Hz), 7.87 (1H, d, J=8Hz)

(2) To a solution of 2,6-dimethyl-3-nitrobenzoic acid (3.09 g) in tetrahydrofuran (5 ml) was added borane-methyl sulfide complex (2.41 g) under ice-cooling, and the mixture was stirred for 30 minutes at the same temperature, for 1 hour at ambient temperature, and then for 4 hours under heating. To the mixture was added 1N hydrochloric acid under ice-cooling, and the mixture was allowed to stand overnight. The mixture was extracted with ethyl acetate twice, and the combined organic layer was washed with saturated sodium bicarbonate solution, water and brine, dried over magnesium sulfate and concentrated. The residue was recrystallized with diisopropyl ether to give 2,6-dimethyl-3-nitrobenzyl alcohol (2.296 g) as a pale yellow crystal.

mp : 99-101°C

NMR (CDCl₃, δ) : 1.45 (1H, t, J=5Hz), 2.50 (3H, s), 2.56 (3H, s), 4.80 (2H, d, J=5Hz), 7.15 (1H, d, J=8Hz), 7.64 (1H, d, J=8Hz)

(3) To a solution of 2,6-dimethyl-3-nitrobenzyl alcohol (1.5 g) and triethylamine (1.01 g) in dichloromethane (15 ml) was dropwise added methanesulfonyl chloride (1.04 g) under ice-cooling, and the mixture was stirred for 30 minutes at the same temperature. The reaction mixture was washed with saturated sodium bicarbonate solution and water, dried over

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magnesium sulfate and concentrated in vacuo to give a mixture of 2,6-dimethyl-3-nitrobenzyl methanesulfonate and 2,6-dimethyl-3-nitrobenzyl chloride, which was used as a starting compound at the following example without further purification.

(4) 8-(2,6-Dimethyl-3-nitrobenzyloxy)-2-methylquinoline was obtained by reacting 8-hydroxy-2-methylquinoline with a mixture of 2,6-dimethyl-3-nitrobenzyl methanesulfonate and 2,6-dimethyl-3-nitrobenzyl chloride obtained above according to a similar manner to that of Preparation 6.

mp : 150-152°C

NMR (CDCl₃, δ) : 2.58 (3H, s), 2.65 (3H, s), 2.73 (3H, s), 5.39 (2H, s), 7.18-7.33 (3H, m), 7.38-7.50 (2H, m), 6.60 (1H, s), 7.72 (1H, d, J=8Hz), 8.04 (1H, d, J=8Hz)

(5) To a suspension of 8-(2,6-dimethyl-3-nitrobenzyloxy)-2-methylquinoline (2.34 g), ferric chloride (70.6 mg) and carbon (70.6 mg) in methanol (35 ml) was added hydrazine monohydrate (1.09 g) at 65°C, and the mixture was refluxed for 2 hours. Methanol (20 ml) was added thereto, and the mixture was refluxed for 1 hour. After cooling chloroform was added thereto, and the resulting precipitates were filtered off. The filtrate was concentrated and the residue was dissolved in chloroform. The solution was washed with saturated sodium bicarbonate solution, water and brine, dried over magnesium sulfate and concentrated. The residue was crystallized with ethyl acetate to give 8-(3-Amino-2,6-dimethylbenzyloxy)-2-methylquinoline (1.67 g) as a pale brown crystal.

mp : 204-205°C

NMR (CDCl₃, δ) : 2.27 (3H, s), 2.37 (3H, s), 2.72 (3H, s), 3.57 (2H, br s), 5.32 (2H, s), 6.67 (1H, d, J=8Hz), 6.91 (1H, d, J=8Hz), 7.18-7.31 (2H, m),

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7.36-7.42 (2H, m), 8.00 (1H, d, J=8Hz)

- 5 (6) 8-[2,6-Dimethyl-3-(phthalimidoacetyl-amino)benzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Preparation 9.

mp : 266-268°C

10 NMR (CDCl₃-CD₃OD, δ) : 2.22 (3H, s), 2.42 (3H, s),
2.68 (3H, s), 4.58 (2H, s), 5.28 (2H, s), 7.08 (1H,
d, J=8Hz), 7.23-7.51 (5H, m), 7.73- 7.80 (2H, m),
7.87-7.95 (2H, m), 8.08 (1H, d, J=8Hz)

- 15 (7) 8-[2,6-Dimethyl-3-[N-(phthalimidoacetyl)-N-methylamino]benzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Preparation 10.
mp : 102-110°C

20 NMR (CDCl₃, δ) : 2.51 (3H, s), 2.57 (3H, s), 2.73 (3H,
s), 3.22 (3H, s), 3.96 (1H, d, J=17Hz), 4.19 (1H,
d, J=17Hz), 5.38 (1H, d, J=10Hz), 5.43 (1H, d,
J=10Hz), 7.17-7.32 (4H, m), 7.37-7.48 (2H, m),
7.67-7.74 (2H, m), 7.80-7.89 (2H, m), 8.02 (1H, d,
J=8Hz)

- 25 (8) 8-[3-(N-Glycyl-N-methylamino)-2,6-dimethylbenzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Preparation 11.

30 NMR (CDCl₃, δ) : 2.32 (3H, s), 2.53 (3H, s), 2.72 (3H,
s), 2.93 (1H, d, J=17Hz), 3.93 (1H, d, J=17Hz),
3.22 (3H, s), 5.36 (2H, s), 7.03 (1H, d, J=8Hz),
7.14 (1H, d, J=8Hz), 7.20-7.32 (2H, m), 7.37-7.48
(2H, m), 8.03 (1H, d, J=8Hz)

- 35 (9) 8-[2,6-Dimethyl-3-[N-methyl-N-[4-(methylcarbamoyl)-cinnamoylglycyl]amino]benzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Example 1.

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5 NMR (CDCl₃, δ) : 2.37 (3H, s), 2.52 (3H, s), 2.72 (3H, s), 3.00 (3H, d, J=5Hz), 3.26 (3H, s), 3.63 (1H, dd, J=17, 4Hz), 3.88 (1H, dd, J=17, 5Hz), 5.35 (2H, s), 6.22 (1H, br d, J=5Hz), 6.52 (1H, d, J=15Hz), 6.75 (1H, br s), 7.08 (1H, d, J=8Hz), 7.18 (1H, d, J=8Hz), 7.22-7.32 (2H, m), 7.41-7.61 (5H, m), 7.73 (2H, d, J=8Hz), 8.04 (1H, d, J=8Hz)

its hydrochloride

10 NMR (CDCl₃-CD₃OD, δ) : 2.30 (3H, s), 2.48 (3H, s), 2.99 (3H, s), 3.12 (3H, br s), 3.28 (3H, s), 3.80 (1H, d, J=17Hz), 3.88 (1H, d, J=17Hz), 5.39 (1H, d, J=10Hz), 5.49 (1H, d, J=10Hz), 6.61 (1H, d, J=15Hz), 7.19-7.28 (2H, m), 7.40-7.53 (3H, m), 7.66 (1H, d, J=8Hz), 7.75-7.97 (5H, m), 8.90 (1H, d, J=8Hz)

20 (10) 8-[3-[N-[(E)-3-(6-Acetylaminopyridin-3-yl)-acryloylglycyl]-N-methylamino]-2,6-dimethylbenzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Example 1.

25 NMR (CDCl₃, δ) : 2.21 (3H, s), 2.36 (3H, s), 2.52 (3H, s), 2.72 (3H, s), 3.26 (3H, s), 3.63 (1H, dd, J=17, 4Hz), 3.89 (1H, dd, J=17, 5Hz), 5.36 (2H, s), 6.45 (1H, d, J=15Hz), 6.72 (1H, br t, J=5Hz), 7.08 (1H, d, J=8Hz), 7.17 (1H, d, J=8Hz), 7.22-7.32 (2H, m), 7.39-7.47 (2H, m), 7.50 (1H, d, J=15Hz), 7.83 (1H, dd, J=8, 3Hz), 8.00-8.08 (2H, m), 8.20 (1H, br d, J=8Hz), 8.34 (1H, br s)

30 its dihydrochloride

35 NMR (CDCl₃-CD₃OD, δ) : 2.30 (3H, s), 2.44 (3H, s), 2.46 (3H, s), 3.20 (3H, s), 3.27 (3H, s), 3.88 (1H, d, J=17Hz), 3.96 (1H, d, J=17Hz), 5.36 (1H, d, J=10Hz), 5.48 (1H, d, J=10Hz), 6.88 (1H, d,

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J=15Hz), 7.21-7.31 (2H, m), 7.48 (1H, d, J=15Hz),
7.65 (1H, d, J=8Hz), 7.78 (1H, d, J=8Hz), 7.87 (1H,
t, J=8Hz), 7.99 (1H, d, J=8Hz), 8.15 (1H, d,
J=8Hz), 8.44 (1H, d, J=8Hz), 8.80-8.90 (2H, m)

5

Example 34

The following compounds were obtained according to a
similar manner to that of Example 20.

- 10 (1) 8-[3-[N-[N'-(6-Methoxycarbonylpyridin-2-yl)-
ureidoacetyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-
methylquinoline

15 NMR (DMSO-d₆, δ) : 2.60 (3H, s), 3.13 (3H, s), 3.53
(1H, dd, J=16.5, 5.5Hz), 3.77 (1H, dd, J=16.5,
5.5Hz), 3.88 (3H, s), 5.46 (1H, d, J=10.5Hz), 5.52
(1H, d, J=10.5Hz), 7.33-7.59 (4H, m), 7.62 (1H, d,
J=8.5Hz), 7.67-7.76 (1H, m), 7.77 (1H, d, J=8.5Hz),
7.80 (1H, d, J=8.5Hz), 7.80-7.91 (1H, m), 7.97 (1H,
m), 8.20 (1H, d, J=8.5Hz), 9.87 (1H, s)

20

- (2) 8-[3-[N-[N'-(2-Acetamidopyridin-4-yl)ureidoacetyl]-N-
methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline

- 25 (3) 8-[2,6-Dichloro-3-[N-[N'-(5-methoxycarbonylpyridin-3-
yl)ureidoacetyl]-N-methylamino]benzyloxy]-2-
methylquinoline

mp : 177-187°C

30 NMR (DMSO-d₆, δ) : 2.63 (3H, s), 3.17 (3H, s), 3.47
(1H, dd, J=16.5, 4.5Hz), 3.69 (1H, dd, J=16.5,
4.5Hz), 3.87 (3H, s), 5.50 (1H, d, J=10.0Hz), 5.57
(1H, d, J=10.0Hz), 6.62 (1H, t, J=4.5Hz), 7.38-7.79
(6H, m), 8.27 (1H, m), 8.49 (1H, d, J=3.0Hz), 8.63
(2H, t, J=3.0Hz), 9.37 (1H, s)

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Example 35

The following compounds were obtained according to a similar manner to that of Example 3.

- 5 (1) 8-[3-[N-[N'-(6-Carboxypyridin-2-yl)ureidoacetyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline
mp : 233-236°C
NMR (DMSO-d₆, δ) : 2.60 (3H, s), 3.11 (3H, s),
3.54 (1H, dd, J=16.5, 5.5Hz), 3.76 (1H, dd, J=16.5,
10 5.5Hz), 5.46 (1H, d, J=10.0Hz), 5.51 (1H, d,
J=10.0Hz), 7.36-7.63 (6H, m), 7.66-7.86 (3H, m),
8.20 (1H, m), 8.22 (1H, d, J=8.5Hz), 9.77 (1H, m)
- 15 (2) 8-[3-[N-[N'-(5-Carboxypyridin-3-yl)ureidoacetyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline

Example 36

The following compounds were obtained according to a similar manner to that of Example 7.

- 20 (1) 8-[2,6-Dichloro-3-[N-[N'-[6-(dimethylcarbamoyl)pyridin-2-yl]ureidoacetyl]-N-methylamino]benzyloxy]-2-methylquinoline (from 8-[3-[N-[N'-(6-carboxypyridin-2-yl)ureidoacetyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline and dimethylamine hydrochloride)
- 25 mp : 110-130°C
NMR (CDCl₃, δ) : 2.71 (3H, s), 3.03 (3H, s), 3.16 (3H, s), 3.23 (3H, s), 3.84 (1H, dd, J=16.5, 5.5Hz),
4.11 (1H, dd, J=16.5, 5.5Hz), 5.56 (1H, d,
30 J=10.0Hz), 5.62 (1H, d, J=10.0Hz), 6.83 (1H, d, J=8.5Hz), 7.13 (1H, d, J=7.5Hz), 7.21-7.35 (3H, m),
7.38-7.49 (3H, m), 7.59 (1H, t, J=8.5Hz), 8.05 (1H, d, J=8.5Hz), 8.72 (1H, s), 9.16 (1H, m)
- 35 its dihydrochloride

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mp : 169-174°C

NMR (DMSO-d₆, δ) : 2.93 (6H, s), 3.00 (3H, s), 3.15 (3H, s), 3.58 (1H, dd, J=16.5, 5.5Hz), 3.82 (1H, dd, J=16.5, 5.5Hz), 5.63 (2H, s), 7.06 (1H, d, J=7.5Hz), 7.46 (1H, d, J=8.5Hz), 7.77 (1H, t, J=7.5Hz), 7.81-7.99 (6H, m), 8.13 (1H, m), 8.98 (1H, m), 9.62 (1H, s)

- (2) 8-[2,6-Dichloro-3-[N-[N'-(5-(dimethylcarbamoyl)pyridin-3-yl)ureidoacetyl]-N-methylamino]benzyloxy]-2-methylquinoline (from 8-[3-[N-[N'-(5-carboxypyridin-3-yl)ureidoacetyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline and dimethylamine hydrochloride)

15 Example 37

- (1) 8-(2-Chloro-5-nitrobenzyloxy)-2-methylquinoline was obtained according to a similar manner to that of Preparation 6.

20 NMR (DMSO-d₆, δ) : 2.69 (3H, s), 5.48 (2H, s), 7.32 (1H, d, J=7.5Hz), 7.43 (1H, d, J=7.5Hz), 7.46 (1H, d, J=7.5Hz), 7.53 (1H, d, J=7.5Hz), 7.83 (1H, d, J=7.5Hz), 8.22 (2H, dd, J=7.5, 2.0Hz), 8.77 (1H, d, J=2.0Hz)

- 25 (2) 8-(5-Amino-2-chlorobenzyloxy)-2-methylquinoline was obtained according to a similar manner to that of Preparation 8.

mp : 176-178°C

30 NMR (DMSO-d₆, δ) : 2.67 (3H, s), 5.22 (2H, s), 5.31 (2H, s), 6.55 (1H, dd, J=7.5, 2.0Hz), 6.80 (1H, d, J=2.0Hz), 7.10-7.16 (2H, m), 7.37-7.48 (3H, m), 8.19 (1H, d, J=7.5Hz)

- 35 (3) 8-[2-Chloro-5-[N-methyl-N-(phthalimidoacetyl)amino]-benzyloxy]-2-methylquinoline was obtained according to a

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similar manners to those of Preparations 9 and 10.

mp : 120-124°C

NMR (DMSO-d₆, δ) : 2.67 (3H, s), 3.18 (3H, bs), 4.06 (2H, bs), 5.42 (2H, bs), 7.29 (1H, d, J=7.5Hz), 7.41-7.96 (10H, m), 8.19 (1H, d, J=7.5Hz)

(4) 8-[5-(N-Glycyl-N-methylamino)-2-chlorobenzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Preparation 11.

mp : 82-87°C

NMR (CDCl₃, δ) : 2.83 (3H, s), 2.94 (2H, s), 3.19 (3H, s), 5.53 (2H, s), 6.95 (1H, d, J=7.5Hz), 7.07 (1H, bd, J=7.5Hz), 7.30-7.44 (3H, m), 7.46 (1H, d, J=8.5Hz), 7.56 (1H, d, J=1.5Hz), 8.05 (1H, d, J=8.5Hz)

(5) 8-[2-Chloro-5-[N-methyl-N-[4-(methylcarbamoyl)-cinnamoylglycyl]amino]benzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Example 1.

mp : 221-228°C

NMR (CDCl₃-CD₃OD, δ) : 2.79 (3H, s), 3.00 (3H, s), 3.24 (3H, s), 3.76 (2H, s), 5.52 (2H, s), 6.52 (1H, d, J=15.0Hz), 7.03 (1H, dd, J=7.5, 1.5Hz), 7.19 (1H, dd, J=7.5, 1.5Hz), 7.33-7.44 (3H, m), 7.49-7.60 (4H, m), 7.68 (1H, d, J=1.5Hz), 7.76 (2H, d, J=7.5Hz), 8.07 (1H, d, J=7.5Hz)

its hydrochloride

mp : 161-171°C

NMR (DMSO-d₆, δ) : 2.79 (3H, d, J=4.5Hz), 2.96 (3H, s), 3.20 (3H, bs), 3.42-4.00 (2H, m), 5.58 (2H, s), 6.85 (1H, d, J=15.0Hz), 7.35 (1H, d, J=15.0Hz), 7.51 (1H, dd, J=7.5, 1.5Hz), 7.61-7.85 (5H, m), 7.63 (2H, d, J=8.5Hz), 7.87 (2H, d, J=8.5Hz), 7.91

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(1H, d, J=7.5Hz), 8.29 (1H, t, J=5.5Hz), 8.53 (1H, q, J=4.5Hz), 8.91 (1H, d, J=7.5Hz)

- 5 (6) 8-[5-[N-[(E)-3-(6-Acetamidopyridin-3-yl)acryloyl]glycyl]-N-methylamino]-2-chlorobenzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Example 1.

mp : 204-205°C

10 NMR (CDCl₃-CD₃OD, δ) : 2.22 (3H, s), 2.81 (3H, s),
3.24 (3H, s), 3.76 (2H, d, J=4.0Hz), 5.52 (2H, s),
6.45 (1H, d, J=16.0Hz), 6.82 (1H, bt, J=4.0Hz),
7.03 (1H, dd, J=7.0, 1.5Hz), 7.17 (1H, dd, J=8.5,
1.5Hz), 7.33-7.41 (3H, m), 7.45-7.53 (2H, m), 7.66
15 (1H, d, J=1.5Hz), 7.85 (1H, dd, J=8.5, 1.5Hz), 8.06
(1H, d, J=8.5Hz), 8.21 (1H, d, J=8.5Hz), 8.33 (1H,
d, J=1.5Hz)

its dihydrochloride

mp : 151-160°C

20 NMR (DMSO-d₆, δ) : 2.11 (3H, s), 2.99 (3H, s), 3.20
(3H, bs), 3.62-3.82 (2H, m), 5.60 (2H, s), 6.77
(1H, d, J=16.0Hz), 7.31 (1H, d, J=16.0Hz), 7.52
(1H, dd, J=8.5, 1.5Hz), 7.64-7.73 (2H, m), 7.77-
7.89 (3H, m), 7.95-8.03 (2H, m), 8.10 (1H, d,
25 J=8.5Hz), 8.24 (1H, t, J=5.5Hz), 8.47 (1H, d,
J=1.5Hz), 9.01 (1H, d, J=8.5Hz)

Example 38

- 30 (1) (E)-3-(2-Acetamidopyridin-4-yl)acrylic acid was obtained by reacting 2-acetamidopyridine-4-carbaldehyde with malonic acid according to a similar manner to that of Preparation 4.

mp : 281-282°C

35 NMR (DMSO-d₆, δ) : 2.10 (3H, s), 6.63 (1H, d,
J=16.0Hz), 7.39 (1H, d, J=5.5Hz), 7.51 (1H, d,

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J=16.0Hz), 8.20 (1H, s), 8.34 (1H, d, J=5.5Hz)

5 (2) 8-[3-[N-[(E)-3-(2-Acetamidopyridin-4-yl)acryloylglycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Example 1.

mp : 115-131°C

10 NMR (DMSO-d₆, δ) : 2.11 (3H, s), 2.60 (3H, s), 3.13 (3H, s), 3.52 (1H, dd, J=16.5, 6.0Hz), 3.82 (1H, dd, J=16.5, 6.0Hz), 5.49 (1H, d, J=10.5Hz), 5.54 (1H, d, J=10.5Hz), 6.98 (1H, d, J=16.0Hz), 7.23 (1H, d, J=5.5Hz), 7.34 (1H, d, J=16.0Hz), 7.35-7.50 (3H, m), 7.54 (1H, d, J=7.5Hz), 7.78 (1H, d, J=8.5Hz), 7.81 (1H, d, J=8.5Hz), 8.21 (1H, d, J=7.5Hz), 8.26 (1H, s), 8.32 (1H, d, J=5.5Hz), 8.57 (1H, t, J=6.0Hz)

its dihydrochloride

mp : 166-171°C

20 NMR (DMSO-d₆, δ) : 2.12 (3H, s), 2.91 (3H, s), 3.16 (3H, s), 3.61 (1H, dd, J=16.5, 6.0Hz), 3.90 (1H, dd, J=16.5, 6.0Hz), 5.62 (1H, d, J=11.5Hz), 5.68 (1H, d, J=11.5Hz), 7.02 (1H, d, J=16.0Hz), 7.28 (1H, d, J=5.5Hz), 7.34 (1H, d, J=16.0Hz), 7.81 (1H, d, J=8.5Hz), 7.85 (1H, d, J=8.5Hz), 7.86-7.93 (3H, m), 7.97 (1H, d, J=8.5Hz), 8.18 (1H, s), 8.33 (1H, d, J=5.5Hz), 8.64 (1H, t, J=6.0Hz), 9.02 (1H, d, J=8.5Hz)

30 Example 39

A mixture of 8-[3-[N-(bromoacetyl)glycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline (90 mg), 4-nitro-1-(1-piperazinyl)benzene (48 mg) and potassium carbonate (94 mg) in dimethylformamide (2 ml) was stirred at ambient temperature for 1 hour and water added thereto. The mixture

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was extracted with ethyl acetate twice, and the combined organic layer was washed with water, dried and concentrated. The residue was purified by preparative thin-layer chromatography (10% methanol in dichloromethane) to give 8-[2,6-dichloro-3-[N-methyl-N-[2-[4-(4-nitrophenyl)piperazin-1-yl]acetyl]glycyl]amino]benzyloxy]-2-methylquinoline (44 mg).

mp : 178-181°C

NMR (CDCl₃, δ) : 2.66-2.78 (4H, m), 2.75 (3H, s), 3.06 (1H, d, J=15Hz), 3.12 (1H, d, J=15Hz), 3.26 (2H, s), 3.43-3.54 (4H, s), 3.55 (1H, dd, J=18 and 4Hz), 3.91 (1H, dd, J=18 and 4Hz), 5.66 (2H, s), 6.84 (2H, d, J=7.5Hz), 7.25-7.34 (4H, m), 7.38-7.53 (3H, m), 7.88 (1H, t, J=4Hz), 8.03 (1H, d, J=7.5Hz), 8.13 (2H, d, J=7.5Hz)

Example 40

(1) To methanol (5 ml) in dry ice-acetone bath was added thionyl chloride (0.41 ml) dropwise over 5 minutes. After (E)-3-(6-Aminopyridin-3-yl)acrylic acid (700 mg) was added to the mixture, the reaction mixture was heated at reflux for 1 hour, and the solvent was removed under reduced pressure. The reaction mixture was adjusted to pH 8 with saturated sodium bicarbonate aqueous solution and extracted with dichloromethane. The organic layer was washed with water and brine, dried over magnesium sulfate and evaporated in vacuo. The precipitate was collected by vacuum filtration and washed with isopropyl ether to give methyl (E)-3-(6-aminopyridin-3-yl)acrylate (725 mg) as a solid.

mp : 173-175°C

NMR (DMSO-d₆, δ) : 3.67 (3H, s), 6.32 (1H, d, J=16Hz), 6.45 (1H, d, J=8Hz), 6.57 (2H, s), 7.51 (1H, d, J=16Hz), 7.79 (1H, dd, J=2, 8Hz), 8.15 (1H, d, J=2Hz)

(2) To a mixture of methyl (E)-3-(6-aminopyridin-3-

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yl)acrylate (700 mg) and triethylamine (477 mg) in dichloromethane (6 ml) was added dropwise 4-bromobutyl chloride (801 mg) under nitrogen in ice water bath and the mixture was stirred for 3 hours at the same temperature. The reaction mixture was poured into water and extracted with dichloromethane. The organic layer was washed with water, saturated sodium bicarbonate aqueous solution and brine, dried over magnesium sulfate and evaporated in vacuo. The residue was chromatographed on silica gel eluting with chloroform and purified by preparative thin-layer chromatography (n-hexane:ethyl acetate=1:1, v/v) to give methyl (E)-3-[6-(4-bromobutyramido)pyridin-3-yl]acrylate (101 mg).

mp : 155.8-172.7°C

NMR (CDCl₃, δ) : 2.27 (2H, quint, J=7.5Hz), 2.62 (2H, t, J=7.5Hz), 3.53 (2H, t, J=7.5Hz), 3.81 (3H, s), 6.43 (1H, d, J=16Hz), 7.64 (1H, d, J=16Hz), 7.87 (1H, dd, J=2, 8Hz), 8.12 (1H, br s), 8.23 (1H, d, J=8Hz), 8.39 (1H, d, J=2Hz)

(3) To a solution of methyl (E)-3-[6-(4-bromobutyramido)-pyridin-3-yl]acrylate (90 mg) in dimethylformamide was added sodium hydride (6.93 mg) at 0°C under nitrogen atmosphere, and the mixture was stirred for 1 hour. The reaction mixture was poured into water and extracted with ethyl acetate. The organic layer was washed with water and brine, dried over magnesium sulfate and concentrated in vacuo to give methyl (E)-3-[6-(2-oxopyrrolidin-1-yl)pyridin-3-yl]acrylate (65 mg).

mp : 151-160°C

NMR (CDCl₃, δ) : 2.16 (2H, quint, J=7.5Hz), 2.69 (2H, t, J=7.5Hz), 3.81 (3H, s), 4.11 (2H, t, J=7.5Hz), 6.43 (1H, d, J=16Hz), 7.65 (1H, d, J=16Hz), 7.87 (1H, dd, J=2, 8Hz), 8.44-8.50 (2H, m)

(4) (E)-3-[6-(2-Oxopyrrolidin-1-yl)pyridin-3-yl]acrylic acid

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was obtained according to a similar manner to that of Preparation 3.

mp : >233°C (dec.)

5 NMR (CD₃OD, δ) : 2.14 (2H, quint, J=7.5Hz), 2.66 (2H, t, J=7.5Hz), 4.11 (2H, t, J=7.5Hz), 6.52 (1H, d, J=16Hz), 7.65 (1H, d, J=16Hz), 8.06 (1H, d, J=8Hz), 8.39 (1H, d, J=8Hz), 8.51 (1H, s-like)

10 (5) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-(2-oxo-pyrrolidin-1-yl)pyridin-3-yl]acryloylglycyl]-amino]benzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Example 1.

15 NMR (CDCl₃, δ) : 2.15 (2H, quint, J=7.5Hz), 2.69 (2H, t, J=7.5Hz), 2.74 (3H, s), 3.27 (3H, s), 3.68 (1H, dd, J=4, 18Hz), 3.95 (1H, dd, J=4, 18Hz), 4.12 (2H, t, J=7.5Hz), 5.60-5.71 (2H, m), 6.48 (1H, d, J=16Hz), 6.66 (1H, t-like), 7.22-7.36 (2H, m), 7.36-7.59 (5H, m), 7.84 (1H, d, J=8Hz), 8.03 (1H, d, J=8Hz), 8.39-8.48 (2H, m)

20 its dihydrochloride

25 NMR (DMSO-d₆, δ) : 2.05 (2H, quint, J=7.5Hz), 2.59 (2H, t, J=7.5Hz), 2.91 (3H, s), 3.15 (3H, s), 3.59 (1H, dd, J=4, 16Hz), 3.89 (1H, dd, J=4, 16Hz), 4.00 (2H, t, J=7.5Hz), 5.56-5.72 (2H, m), 6.81 (1H, d, J=16Hz), 7.39 (1H, d, J=16Hz), 7.77-8.08 (7H, m), 8.29-8.40 (2H, m), 8.55 (1H, d, J=2Hz), 8.97 (1H, brpeak)

30 Example 41

(1) A mixture of 2-methoxyaniline (10 g), acetic acid (1 ml) and ethyl 2-acetylpropionate (12.3 g) in benzene (30 ml) was refluxed for 24 hours, and then the solvent was removed to give crude ethyl 3-(2-methoxyanilino)-2-methyl-2-butenate, which was used as a starting compound at the following

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example without further purification.

(2) A mixture of biphenyl (15 g) and diphenyl ether (15 ml) was heated at 250-270°C, and 3-(2-methoxyanilino)-2-methyl-2-butenolate obtained above was added thereto. The mixture was stirred at the same temperature for 1 hour. During cooling n-hexane (30 ml) was added to the mixture, and the resulting precipitates were collected by filtration. The residue was recrystallized with acetonitrile to give 2,3-dimethyl-4-hydroxy-8-methoxyquinoline (4.49 g).

mp : 299.2°C

NMR (DMSO-d₆, δ) : 1.95 (3H, s), 2.43 (3H, s), 3.97 (3H, s), 7.13 (1H, d, J=9Hz), 7.16 (1H, d, J=9Hz), 7.56-7.66 (1H, m)

(3) To a suspension of 2,3-dimethyl-4-hydroxy-8-methoxyquinoline (3.0 g) in phosphoryl chloride was dropwise added N,N-dimethylaniline (3.58 g) under ice-cooling, and the mixture was stirred for 15 minutes at the same temperature, for 30 minutes at ambient temperature and then for 1 hour at 70°C. The solvent was removed, and saturated sodium bicarbonate solution and 10% solution of methanol in dichloromethane were added to the residue. The organic layer was dried over magnesium sulfate and concentrated. The residue was purified by flash chromatography (ethyl acetate:n-hexane = 1:2 v/v) to give 4-chloro-2,3-dimethyl-8-methoxyquinoline (3.02 g).

mp : 134.4-137.6°C

NMR (CDCl₃, δ) : 2.55 (3H, s), 2.78 (3H, s), 4.06 (3H, s), 7.02 (1H, d, J=9Hz), 7.45 (1H, t, J=9Hz), 7.74 (1H, d, J=9Hz)

(4) To a solution of 4-chloro-2,3-dimethyl-8-methoxyquinoline (2.5 g) in dichloromethane (5 ml) was added boron tribromide (22.6 ml) under ice-cooling, and the mixture

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was stirred for 3 hours. The reaction mixture was extracted with 10% solution of methanol in chloroform, and the organic layer was dried over magnesium sulfate and concentrated. The residue was dissolved in acetonitrile under heating, and the mixture was allowed to cool. The resulting precipitates were collected by filtration to give 4-chloro-2,3-dimethyl-8-hydroxyquinoline (1.50 g).

mp : 120.5°C

NMR (CDCl₃, δ) : 2.54 (3H, s), 2.71 (3H, s), 7.11 (1H, d, J=9Hz), 7.44 (1H, t, J=9Hz), 7.59 (1H, d, J=9Hz)

(5) 4-Chloro-8-[2,6-Dichloro-3-[N-methyl-N-[4-(methyl-carbamoyl)cinnaomylglycyl]amino]benzyloxy]-2,3-dimethylquinoline was obtained according to a similar manner to that of Example 9.

NMR (CDCl₃, δ) : 2.54 (3H, s), 2.72 (3H, s), 2.98 (3H, d, J=5Hz), 3.24 (3H, s), 3.62 (1H, dd, J=17, 4Hz), 3.91 (1H, dd, J=17, 5Hz), 5.60 (1H, d, J=9Hz), 5.65 (1H, d, J=9Hz), 6.25 (1H, br q, J=5Hz), 6.51 (1H, d, J=15Hz), 6.68 (1H, t, J=5Hz), 7.24-7.34 (3H, m), 7.43-7.57 (4H, m), 7.57 (1H, d, J=15Hz), 7.74 (2H, d, J=9Hz), 7.86 (1H, d, J=9Hz)

its hydrochloride

NMR (CDCl₃-CD₃OD, δ) : 2.74 (3H, s), 2.99 (3H, s), 3.13 (3H, br s), 3.29 (3H, s), 3.85 (1H, d, J=17Hz), 4.18 (1H, d, J=17Hz), 5.59 (1H, d, J=9Hz), 5.73 (1H, d, J=9Hz), 6.65 (1H, d, J=15Hz), 7.40 (1H, d, J=15Hz), 7.45-7.70 (5H, m), 7.77 (2H, d, J=9Hz), 7.94 (1H, t, J=9Hz), 8.08 (1H, d, J=8Hz)

Example 42

(1) Ethyl 3-(2-benzyloxylanilino)-2-butenate was obtained by reacting 2-benzyloxylaniline with ethyl acetoacetate according to a similar manner to that of Example 41-(1).

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NMR (CDCl₃, δ) : 1.28 (3H, t, J=7Hz), 1.99 (3H, s),
4.16 (2H, q, J=7.0Hz), 4.73 (1H, s), 5.11 (2H, s),
6.88-6.99 (2H, m), 7.03-7.15 (2H, m), 7.26-7.40
(3H, m), 7.47 (2H, d, J=8.5Hz)

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(2) 8-Benzyloxy-4-hydroxy-2-methylquinoline was obtained
according to a similar manner to that of Example 41-(2).

mp : 155-164°C

10 NMR (DMSO-d₆, δ) : 2.40 (3H, s), 5.38 (2H, s), 5.90
(1H, s), 7.13 (1H, t, J=8.5Hz), 7.22 (1H, d,
J=8.5Hz), 7.28-7.43 (3H, m), 7.53 (2H, d, J=8.5Hz),
7.57 (1H, d, J=8.5Hz)

15 (3) 8-Benzyloxy-4-ethoxycarbonylmethoxy-2-methylquinoline
was obtained by reacting 8-benzyloxy-4-hydroxy-2-
methylquinoline with ethyl bromoacetate according to a
similar manner to that of Preparation 20-(1).

mp : 138-140°C

20 NMR (CDCl₃, δ) : 1.31 (3H, t, J=7.5Hz), 2.74 (3H, s),
4.31 (2H, q, J=7.5Hz), 4.81 (2H, s), 5.43 (2H, s),
6.53 (1H, s), 7.02 (1H, d, J=8.5Hz), 7.22-7.40 (4H,
m), 7.51 (2H, d, J=8.5Hz), 7.79 (1H, d, J=8.5Hz)

25 (4) A mixture of 8-benzyloxy-4-ethoxycarbonylmethoxy-2-
methylquinoline (1.30 g) and palladium on carbon (130 mg) in
a mixture of ethanol (8 ml) and dioxane (7 ml) was stirred
for 3 hours at ambient temperature under hydrogen atmosphere.
The reaction mixture was filtered, and the filtrate was
concentrated in vacuo to give 4-ethoxycarbonylmethoxy-8-
30 hydroxy-2-methylquinoline (539 mg).

mp : 97-98°C

35 NMR (DMSO-d₆, δ) : 1.23 (3H, t, J=7.5Hz), 2.60 (3H,
s), 4.22 (2H, q, J=7.5Hz), 5.07 (2H, s), 6.92 (1H,
s), 7.04 (1H, d, J=8.5Hz), 7.34 (1H, t, J=8.5Hz),
7.52 (1H, d, J=8.5Hz)

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(5) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)-cinnamoylglycyl]amino]benzyloxy]-4-ethoxycarbonylmethoxy-2-methylquinoline was obtained according to a similar manner to that of Example 9.

5 mp : 134-147°C

NMR (DMSO-d₆, δ) : 1.22 (3H, t, J=7.5Hz), 2.53 (3H, s), 2.79 (3H, d, J=5.5Hz), 3.15 (3H, s), 3.51 (1H, dd, J= 16.5, 5.5Hz), 3.81 (1H, dd, J=16.5, 5.5Hz), 4.21 (2H, q, J=7.5Hz), 5.07 (2H, s), 5.47 (1H, d, J=11.5Hz), 5.53 (1H, d, J=11.5Hz), 6.88 (1H, d, J=15Hz), 6.91 (1H, s), 7.34-7.49 (3H, m), 7.61-7.68 (2H, m), 7.72-7.80 (3H, m), 7.86 (2H, d, J=8.5Hz), 8.33 (1H, t, J=5.5Hz), 8.49 (1H, q, J=5.5Hz)

15 its hydrochloride

mp : 147-158°C

NMR (DMSO-d₆, δ) : 1.28 (3H, t, J=7.5Hz), 2.79 (3H, d, J=4.5Hz), 2.83 (3H, s), 3.15 (3H, s), 3.60 (1H, dd, J= 16.5, 4.5Hz), 3.91 (1H, dd, J=16.5, 4.5Hz), 4.24 (2H, q, J=7.5Hz), 5.37 (2H, s), 5.62 (1H, d, J=10.5Hz), 5.67 (1H, d, J=10.5Hz), 6.89 (1H, d, J=16Hz), 7.42 (1H, d, 16Hz), 7.57-7.70 (3H, m), 7.79-8.00 (7H, m), 8.39 (1H, t, J=4.5Hz), 8.52 (1H, q, J=4.5Hz)

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(6) 4-Carboxymethoxy-8-[2,6-dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)cinnamoylglycyl]amino]benzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Example 3.

30 mp : 233-257°C

NMR (DMSO-d₆, δ) : 2.54 (3H, s), 2.78 (3H, d, J=4.5Hz), 3.17 (3H, s), 3.51 (1H, dd, J=16.5, 4.5Hz), 3.82 (1H, dd, J=16.5, 4.5Hz), 4.96 (2H, s), 5.47 (1H, d, J=10Hz), 5.53 (1H, d, J=10Hz), 6.89 (1H, d, J=16.5Hz), 6.93 (1H, s), 7.33-7.50 (3H, m),

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7.60-7.70 (2H, m), 7.73-7.81 (3H, m), 7.85 (2H, d, J=8.5Hz), 8.32 (1H, t, J=4.5Hz), 8.49 (1H, q, J=4.5Hz)

5 (7) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)-
cinnamoylglycyl]amino]benzyloxy]-4-dimethylcarbamoylmethoxy-
2-methylquinoline was obtained from 4-carboxymethoxy-8-[2,6-
dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)cinnamoylglycyl]-
10 amino]benzyloxy]-2-methylquinoline and dimethylamine
hydrochloride according to a similar manner to that of
Example 7.

15 NMR (DMSO-d₆, δ) : 2.53 (3H, s), 2.76 (3H, d, J=4.5 Hz), 2.86 (3H, s), 3.04 (3H, s), 3.15 (3H, s), 3.50 (1H, dd, J= 16.5, 4.5Hz), 3.80 (1H, dd, J=16.5, 4.5Hz), 5.10 (2H, s), 5.45 (1H, d, J=9Hz), 5.51 (1H, d, J=9Hz), 6.87 (1H, d, J=15Hz), 6.88 (1H, s), 7.32-7.48 (3H, m), 7.61-7.69 (2H, m), 7.73-7.81 (3H, m), 7.87 (2H, d, J=8.5Hz), 8.33 (1H, t, J=4.5Hz), 8.48 (1H, q, J=4.5Hz)

20

its hydrochloride

mp : 157-172°C

25 NMR (DMSO-d₆, δ) : 2.78 (3H, d, J=4.5Hz), 2.83 (3H, s), 2.90 (3H, s), 3.03 (3H, s), 3.15 (3H, s), 3.60 (1H, dd, J=16.5, 4.5Hz), 3.91 (1H, dd, J=16.5, 4.5Hz), 5.49 (2H, s), 5.61 (1H, d, J=11.5Hz), 5.66 (1H, d, J=11.5Hz), 6.88 (1H, d, J=16.0Hz), 7.42 (1H, d, J=16.0Hz), 7.53 (1H, s), 7.63 (2H, d, J=8.5Hz), 7.79-7.89 (5H, m), 7.91-7.99 (2H, m), 8.38 (1H, t, J=4.5Hz), 8.52 (1H, q, J=4.5Hz)

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Preparation 34

(1) 1-(tert-Butyldiphenylsilyloxymethyl)-2,6-dimethyl-3-nitrobenzene was obtained by reacting 2,6-dimethyl-3-nitrobenzyl alcohol with tert-butyldiphenylsilyl chloride

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according to a similar manner to that of Preparation 18-(1).

NMR (CDCl₃, δ) : 1.03 (9H, s), 2.20 (3H, s), 2.38 (3H, s), 5.73 (2H, s), 7.06 (1H, d, J=8Hz), 7.33-7.49 (6H, m), 7.58-7.73 (5H, m)

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(2) To a suspension of 1-(tert-butyldiphenylsilyloxymethyl)-2,6-dimethyl-3-nitrobenzene (42 g) and ammonium chloride (4.2 g) in ethanol (378 ml)-water (42 ml) was added iron (7.0 g), and the mixture was refluxed for 6 hours, during which iron (7.0 g) was added thereto twice. Insoluble materials were filtered off, and the filtrate was concentrated. To the residue was added water and extracted with ethyl acetate. The organic layer was washed with water and brine, dried over magnesium sulfate and concentrated to give 3-amino-1-(tert-butyldiphenylsilyloxymethyl)-2,6-dimethylbenzene (42.8 g) as pale yellow oil.

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NMR (CDCl₃, δ) : 1.04 (9H, s), 2.09 (3H, s), 2.11 (3H, s), 3.48 (2H, br s), 4.70 (2H, s), 6.58 (1H, d, J=8Hz), 6.71 (1H, d, J=8Hz), 7.33-7.48 (6H, m), 7.66-7.73 (4H, m)

(3) 1-(tert-Butyldiphenylsilyloxymethyl)-2,6-dimethyl-3-(phthalimidoacetylamino)benzene was obtained according to a similar manner to that of Preparation 9.

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mp : 207-210°C

NMR (CDCl₃, δ) : 1.02 (9H, s), 2.12 (3H, s), 2.19 (3H, s), 4.52 (2H, s), 4.70 (2H, s), 6.95 (1H, d, J=8Hz), 7.25-7.50 (7H, m), 7.63-7.80 (6H, m), 7.86-7.96 (2H, m)

30

(4) 1-(tert-Butyldiphenylsilyloxymethyl)-2,6-dimethyl-3-[N-methyl-N-(phthalimidoacetyl)amino]benzene was obtained according to a similar manner to that of Preparation 10.

mp : 180-182°C

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NMR (CDCl₃, δ) : 1.04 (9H, s), 2.21 (3H, s), 2.27 (3H,

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s), 3.17 (3H, s), 3.82 (1H, d, J=17Hz), 4.12 (1H, d, J=17Hz), 4.78 (2H, s), 7.09 (1H, d, J=8Hz), 7.15 (1H, d, J=8Hz), 7.34-7.49 (6H, m), 7.65-7.73 (6H, m), 7.80-7.88 (2H, m)

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(5) 3-(N-Glycyl-N-methylamino)-1-(tert-butyldiphenylsilyloxymethyl)-2,6-dimethylbenzene was obtained according to a similar manner to that of Preparation 11.

10 NMR (CDCl₃, δ) : 1.03 (9H, s), 2.02 (3H, s), 2.22 (3H, s), 2.82 (1H, d, J=17Hz), 3.09 (1H, d, J=17Hz), 3.15 (3H, s), 4.72 (2H, s), 6.92 (1H, d, J=8Hz), 7.01 (1H, d, J=8Hz), 7.32-7.49 (6H, m), 7.62-7.70 (4H, m)

15 (6) 1-(tert-Butyldiphenylsilyloxymethyl)-2,6-dimethyl-3-[N-methyl-N-[4-(methylcarbamoyl)cinnamoylglycyl]amino]benzene was obtained according to a similar manner to that of Preparation 18-(6).

mp : 204-208°C

20 NMR (CDCl₃, δ) : 1.05 (9H, s), 2.05 (3H, s), 2.26 (3H, s), 3.02 (3H, d, J=5Hz), 3.20 (3H, s), 3.52 (1H, dd, J=17, 5Hz), 3.87 (1H, dd, J=17, 5Hz), 4.73 (2H, s), 6.16 (1H, br d, J=5Hz), 6.51 (1H, d, J=15Hz), 6.69 (1H, br t, J=5Hz), 6.98 (1H, d, J=8Hz), 7.06 (1H, d, J=8Hz), 7.35-7.48 (6H, m), 7.51-7.60 (3H, m), 7.65-7.80 (6H, m)

25 (7) 2,6-Dimethyl-1-hydroxymethyl-3-[N-methyl-N-[4-(methylcarbamoyl)cinnamoylglycyl]amino]benzene was obtained according to a similar manner to that of Preparation 18-(7).

mp : 261-263°C

30 NMR (DMSO-d₆, δ) : 2.27 (3H, s), 2.40 (3H, s), 2.79 (3H, d, J=5Hz), 3.08 (3H, s), 3.43 (1H, dd, J=17, 5Hz), 3.65 (1H, dd, J=17, 5Hz), 4.53 (2H, d, J=5Hz), 4.88 (1H, t, J=5Hz), 6.89 (1H, d, J=15Hz),

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7.15 (2H, s), 7.41 (1H, d, J=15Hz), 7.64 (2H, d, J=8Hz), 7.85 (2H, d, J=8Hz), 8.21 (1H, br t, J=5Hz), 8.48 (1H, br d, J=8Hz)

- 5 (8) To a solution of 2,6-dimethyl-1-hydroxymethyl-3-[N-methyl-N-[4-(methylcarbamoyl)cinnamoylglycyl]amino]benzene (2.00 g) in N,N-dimethylformamide (100 ml) was added methanesulfonyl chloride (784 mg) under ice-cooling, and the mixture was stirred for 2 hours at the same temperature and
10 overnight at ambient temperature. To the mixture was added water and extracted with chloroform. The organic layer was washed with brine, dried over magnesium sulfate and concentrated. The residue was pulverized with diethyl ether to give 1-chloromethyl-2,6-dimethyl-3-[N-[4-(methylcarbamoyl)cinnamoylglycyl]-N-methylamino]benzene (2.00
15 g) as white powder.

mp : 232°C

NMR (CDCl₃, δ) : 2.29 (3H, s), 2.46 (3H, s), 3.03 (3H, d, J=5Hz), 3.24 (3H, s), 3.59 (1H, d, J=17, 5Hz),
20 3.82 (1H, dd, J=17, 4Hz), 4.67 (2H, s), 6.20 (1H, m), 6.50 (1H, d, J=15Hz), 6.70 (1H, d, J=5Hz), 7.04 (1H, d, J=9Hz), 7.14 (1H, d, J=9Hz), 7.50-7.60 (3H, m), 7.75 (2H, d, J=9Hz)

25 Preparation 35

- (1) 2,6-Dimethyl-1-hydroxymethyl-3-[N-methyl-N-(phthalimidoacetyl)amino]benzene was obtained from 1-(tert-butyl)diphenylsilyloxymethyl)-2,6-dimethyl-3-[N-methyl-N-(phthalimidoacetyl)amino]benzene according to a similar
30 manner to that of Preparation 18-(7).

mp : 241-243°C

NMR (CDCl₃, δ) : 2.47 (3H, s), 2.48 (3H, s), 3.20 (3H, s), 3.81 (1H, d, J=17Hz), 4.18 (1H, d, J=17Hz),
35 4.83 (2H, s), 7.14 (1H, d, J=8Hz), 7.19 (1H, d, J=8Hz), 7.68-7.75 (2H, m), 7.80-7.88 (2H, m)

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(2) A mixture of 2,6-dimethyl-1-methanesulfonyloxymethyl-3-[N-methyl-N-(phthalimidoacetyl)amino]benzene and 1-chloromethyl-2,6-dimethyl-3-[N-methyl-N-(phthalimidoacetyl)amino]benzene was obtained according to a similar manner to that of Example 33-(3).

Preparation 36

(1) 1-(tert-Butyldiphenylsilyloxymethyl)-2,4,6-trimethyl-3-nitrobenzene was obtained by reacting 2,4,6-trimethyl-3-nitrobenzyl alcohol with tert-butyldiphenylsilyl chloride according to a similar manner to that of Preparation 18-(1).

mp : 81-83°C

NMR (CDCl₃, δ) : 1.02 (9H, s), 2.13 (3H, s), 2.18 (3H, s), 2.23 (3H, s), 4.67 (2H, s), 6.88 (1H, s), 7.35-7.48 (6H, m), 7.65 (4H, d, J=8Hz)

(2) 3-Amino-1-(tert-butyldiphenylsilyloxymethyl)-2,4,6-trimethylbenzene was obtained according to a similar manner to that of Preparation 34-(2).

NMR (CDCl₃, δ) : 1.03 (9H, s), 2.08 (3H, s), 2.13 (3H, s), 2.16 (3H, s), 3.48 (2H, br s), 4.68 (2H, s), 6.72 (1H, s), 7.33-7.47 (6H, m), 7.70 (4H, d, J=8Hz)

(3) 1-(tert-Butyldiphenylsilyloxymethyl)-3-(phthalimidoacetyl-amino)-2,4,6-trimethylbenzene was obtained according to a similar manner to that of Preparation 9.

mp : 218-220°C

NMR (CDCl₃, δ) : 1.01 (6H, s), 1.04 (3H, s), 2.11 (2H, s), 2.15 (2H, s), 2.18 (2H, s), 2.21 (1H, s), 2.31 (1H, s), 2.39 (1H, s), 3.94 (0.7H, s), 4.5 (1.3H, s), 4.64 (1.3H, s), 4.72 (0.7H, s), 6.71 (0.4H, s), 6.86 (0.6H, s), 6.93 (0.6H, s), 6.99 (0.4H, s), 7.32-7.46 (6H, m), 7.83-7.88 (0.6H, m), 7.90-7.94 (1.4H, m)

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(4) 1-(tert-Butyldiphenylsilyloxymethyl)-3-[N-methyl-N-(phthalimidoacetyl)amino]-2,4,6-trimethylbenzene was obtained according to a similar manner to that of Preparation 10.

mp : 146.5-149.7°C

5 NMR (CDCl₃, δ) : 1.04 (9H, s), 2.19 (3H, s), 2.23 (3H, s), 2.32 (3H, s), 3.12 (3H, s), 3.85 (1H, d, J=17Hz), 3.92 (1H, d, J=17Hz), 4.72 (2H, s), 7.00 (1H, s), 7.33-7.48 (6H, m), 7.63-7.73 (6H, m), 7.80-7.88 (2H, m)

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(5) 1-Hydroxymethyl-3-[N-methyl-N-(phthalimidoacetyl)amino]-2,4,6-trimethylbenzene was obtained according to a similar manner to that of Preparation 18-(7).

mp : 254-256°C

15 NMR (CDCl₃, δ) : 2.33 (3H, s), 2.44 (6H, s), 3.26 (3H, s), 3.95 (2H, s), 4.78 (2H, s), 7.05 (1H, s), 7.67-7.74 (2H, m), 7.80-7.88 (2H, m)

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(6) A mixture of 1-methanesulfonyloxymethyl-3-[N-methyl-N-(phthalimidoacetyl)amino]-2,4,6-trimethylbenzene and 1-chloromethyl-3-[N-methyl-N-(phthalimidoacetyl)amino]-2,4,6-trimethylbenzene was obtained according to a similar manner to that of Example 33-(3).

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Preparation 37

(1) 2,6-Dimethoxy-3-nitrobenzyl alcohol was obtained from 2,6-dimethoxy-3-nitrobenzoic acid according to a similar manner to that of Example 33-(2).

mp : 71-73°C

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NMR (CDCl₃, δ) : 2.31 (1H, t, J=7.5Hz), 3.96 (3H, s), 3.98 (3H, s), 4.78 (2H, d, J=7.5Hz), 6.75 (1H, d, J=8Hz), 7.99 (1H, d, J=8Hz)

(2) A mixture of 2,6-dimethoxy-3-nitrobenzyl methanesulfonate and 2,6-dimethoxy-3-nitrobenzyl chloride was obtained

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according to a similar manner to that of Example 33-(3).

Preparation 38

5 (1) 1-(tert-Butyldiphenylsilyloxymethyl)-2,6-dimethyl-3-[N-ethyl-N-(phthalimidoacetyl)amino]benzene was obtained by reacting 1-(tert-butyl-diphenylsilyloxymethyl)-2,6-dimethyl-3-(phthalimidoacetyl-amino)benzene with ethyl iodide according to a similar manner to that of Preparation 10.

mp : 146-150°C

10 NMR (CDCl₃, δ) : 1.04 (9H, s), 1.12 (3H, t, J=7.5Hz), 2.22 (3H, s), 2.28 (3H, s), 3.21 (1H, q, J=7.5Hz), 3.78 (1H, d, J=17Hz), 4.01-4.12 (2H, m), 4.78 (2H, s), 7.10 (2H, s), 7.33-7.47 (6H, m), 7.65-7.73 (6H, m), 7.80-7.88 (2H, m)

15 (2) 2,6-Dimethyl-1-hydroxymethyl-3-[N-ethyl-N-(phthalimidoacetyl)amino]benzene was obtained according to a similar manner to that of Preparation 18-(7).

mp : 205-207°C

20 NMR (CDCl₃, δ) : 1.12 (3H, t, J=7.5Hz), 1.50 (1H, br s), 2.46 (3H, s), 2.49 (3H, s), 3.24 (1H, m), 3.88 (1H, d, J=17Hz), 4.03-4.19 (2H, m), 4.73 (2H, br s), 7.15 (2H, s), 7.68-7.75 (2H, m), 7.80-7.88 (2H, m)

25 (3) A mixture of 2,6-dimethyl-1-methanesulfonyloxymethyl-3-[N-ethyl-N-(phthalimidoacetyl)amino]benzene and 1-chloromethyl-2,6-dimethyl-3-[N-ethyl-N-(phthalimidoacetyl)amino]benzene was obtained according to a similar manner to that of Example 33-(3).

Preparation 39

35 (1) To a stirred solution of 8-benzyloxy-4-hydroxy-2-methylquinoline (5.00 g) and 2,6-lutidine (3.03 g) and 4-dimethylaminopyridine (230 mg) in dichloromethane (80 ml) was

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added trifluoromethanesulfonic anhydride (5.85 g) dropwise in an ice bath. The reaction mixture was stirred at the same temperature for half an hour and then at ambient temperature for an hour. The mixture was poured into saturated ammonium chloride (100 ml), extracted with chloroform and dried over anhydrous magnesium sulfate. The solvent was removed in vacuo and the residual solid was crystallized from 90% aqueous acetonitrile (100 ml) and collected to give 8-benzyloxy-2-methyl-4-(trifluoromethanesulfonyloxy)quinoline (6.58 g) as white powder.

mp : 158°C

NMR (CDCl₃, δ) : 2.86 (3H, s), 5.46 (2H, s), 7.10 (1H, d, J=7.5Hz), 7.25-7.60 (8H, m)

(2) A mixture of 8-benzyloxy-2-methyl-4-(trifluoromethanesulfonyloxy)quinoline (300 mg), vinyltributyltin (263 mg), tetrakis(triphenylphosphine)palladium(0) (43.6 mg) and lithium chloride (96 mg) in 1,4-dioxane (6 ml) was refluxed for three hours and then left at ambient temperature overnight. The mixture was diluted with ethyl acetate and was added silica gel (70-230 mesh, 5 g) and stirred at ambient temperature for half an hour. The silica gel was removed by filtration and the filtrate was concentrated in vacuo. The residue was chromatographed on a silica gel column eluting with ethyl acetate - n-hexane (1:4, V/V) to give a solid. This solid was crystallized from diisopropyl ether to give 8-benzyloxy-2-methyl-4-vinylquinoline (110 mg) as pale yellow solid.

mp : 114.2°C

NMR (CDCl₃, δ) : 2.80 (3H, s), 5.45 (2H, s), 5.60 (1H, d, J=10Hz), 5.91 (1H, d, J=16Hz), 6.98 (1H, d, J=7.5Hz), 7.20-7.40 (5H, m), 7.44-7.53 (2H, m), 7.59 (1H, d, J=7.5Hz)

(3) To a stirred solution of 8-benzyloxy-2-methyl-4-

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vinylquinoline (200 mg) in 1,4-dioxane - water (3:1, V/V, 1 ml) was added catalytic amount of osmium tetroxide in tert-butanol in an ice bath. Sodium periodate (342 mg) was added to the reaction mixture portionwise and the resulting suspension was vigorously stirred overnight at ambient temperature. The mixture was extracted with ethyl acetate and washed with water and brine. The organic layer was dried over anhydrous magnesium sulfate and concentrated in vacuo to give a brown oil. This was purified by a silica gel column eluting with ethyl acetate - n-hexane (1:3, V/V) to give 8-benzyloxy-4-formyl-2-methylquinoline as a yellow solid (123 mg).

mp : 129.1°C

NMR (CDCl₃, δ) : 2.90 (3H, s), 5.46 (2H, s), 7.10 (1H, d, J=7.5Hz), 7.24-7.40 (3H, m), 7.41-7.55 (3H, m), 7.71 (1H, s), 8.46 (1H, d, J=8.0Hz), 10.49 (1H, s)

(4) To a stirred solution of sodium dihydrogenphosphate dihydrate (788 mg) and 2-methyl-2-butene (885 mg) in tert-butanol (12 ml) and water (3 ml) was added 8-benzyloxy-4-formyl-2-methylquinoline (700 mg) and sodium chloride (79% purity, 457 mg) successively at ambient temperature. After being stirred for one and half an hour, the reaction was quenched with water (12 ml), then the pH of the mixture was adjusted to about 3-4 by addition of 1N hydrochloric acid. The mixture was extracted with chloroform and dried over anhydrous magnesium sulfate. The organic phase was concentrated in vacuo and the residual solid was triturated with diethyl ether to give 8-benzyloxy-4-carboxy-2-methylquinoline (729 mg, 98.5%) as a pale yellow powder.

mp : 241.3°C

NMR (CDCl₃-CD₃OD, δ) : 2.82 (3H, s), 5.41 (2H, s), 7.07 (1H, d, J=7.5Hz), 7.24-7.53 (6H, m), 7.84 (1H, s), 8.26 (1H, d, J=7.5Hz)

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(5) To a stirred mixture of 8-benzyloxy-4-carboxy-2-methylquinoline (700 mg), potassium carbonate (659 mg) and N,N-dimethylformamide (0.3 ml) was dropwise added ethyl iodide (409 mg) under ice-cooling and the mixture was stirred for 30 minutes at the same temperature and for 1 hour at ambient temperature. To the mixture was added water and extracted with ethyl acetate. The organic layer was washed with water and brine, dried over magnesium sulfate, dried over magnesium sulfate. The solvent was removed, and the residue was crystallized from diisopropyl ether to give 8-benzyloxy-4-ethoxycarbonyl-2-methylquinoline (686 mg) as solid.

mp : 134.5°C

NMR (CDCl₃, δ) : 1.46 (3H, t, J=7.5Hz), 2.85 (3H, s), 4.48 (2H, q, J=7.5Hz), 5.45 (2H, s), 7.04 (1H, d, J=7.5Hz), 7.26-7.43 (4H, m), 7.46-7.55 (2H, m), 7.79 (1H, s), 8.19 (1H, d, J=7.5Hz)

(6) A mixture of 8-benzyloxy-4-ethoxycarbonyl-2-methylquinoline (663 mg) and palladium(II) hydroxide (60 mg) in a mixture of ethanol (6 ml) and dioxane (6 ml) was stirred for 3 hours at ambient temperature under hydrogen atmosphere. The reaction mixture was filtered, and the filtrate was concentrated. The residue was pulverized with n-hexane to give 4-ethoxycarbonyl-8-hydroxy-2-methylquinoline (370 mg) as pale yellow solid.

mp : 71.8°C

NMR (CDCl₃, δ) : 1.46 (3H, t, J=7.5Hz), 2.77 (3H, s), 4.49 (2H, q, J=7.5Hz), 7.16 (1H, d, J=7.5Hz), 7.46 (1H, t, J=7.5Hz), 7.83 (1H, s), 8.11 (1H, d, J=7.5Hz), 8.35 (1H, br s)

Preparation 40

A mixture of 8-benzyloxy-2-methyl-4-vinylquinoline (200 mg) and palladium(II) hydroxide (40 mg) in a mixture of

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ethanol (1.5 ml) and dioxane (1.5 ml) was stirred for 9 hours at ambient temperature under hydrogen atmosphere. The reaction mixture was filtered, and the filtrate was concentrated. The residue was purified by flash chromatography (ethyl acetate : n-hexane = 1:2, V/V) to give 4-ethyl-8-hydroxy-2-methylquinoline (66 mg) as brown oil.

NMR (CDCl₃, δ) : 1.36 (3H, t, J=7.5Hz), 2.68 (3H, s), 3.04 (2H, q, J=7.5Hz), 7.10 (1H, d, J=9Hz), 7.15 (1H, s), 7.36 (1H, t, J=9Hz), 7.44 (1H, d, J=7.5Hz)

Preparation 41

(1) To a suspension of 8-benzyloxy-4-formyl-2-methylquinoline (300 mg) in a mixture of methanol (3 ml) and tetrahydrofuran (2 ml) was added sodium borohydride (20.6 mg) portionwise in an ice bath. The suspension was stirred for half an hour, then quenched with saturated sodium chloride. The mixture was extracted with chloroform and the organic layer was dried over anhydrous magnesium sulfate. After being concentrated in vacuo the residue was chromatographed on silica gel eluting with ethyl acetate - n-hexane to give an amorphous solid which was solidified with diisopropyl ether to afford 8-benzyloxy-4-hydroxymethyl-2-methylquinoline (250 mg) as a colorless solid.

mp : 137.0-140.7°C

NMR (CDCl₃, δ) : 2.79 (3H, s), 5.12 (2H, br s), 5.45 (2H, s), 6.99 (1H, d, J=8Hz), 7.21-7.45 (6H, m), 7.53 (2H, d, J=9Hz)

(2) 4-Hydroxymethyl-8-hydroxy-2-methylquinoline was obtained according to a similar manner to that of Preparation 39-(6).

NMR (CDCl₃-CD₃OD, δ) : 2.71 (3H, s), 5.10 (2H, s), 7.11 (1H, d, J=8Hz), 7.29-7.43 (2H, m), 7.51 (1H, s)

Preparation 42

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(1) To a solution of 8-benzyloxy-4-hydroxymethyl-2-methylquinoline (148 mg) in N,N-dimethylformamide (1.5 ml) was added sodium hydroxide (60% in oil, 23.3 mg) under ice-cooling, and the mixture was stirred for 15 minutes at the same temperature. To the mixture was added methyl iodide (82.7 mg) under ice-cooling, and the mixture was stirred for 15 minutes at the same temperature and then overnight at ambient temperature. To the mixture was added saturated sodium bicarbonate solution, and the mixture was extracted with ethyl acetate. The organic layer was washed with water twice, dried over magnesium sulfate and concentrated in vacuo. The residue was purified by flash chromatography (ethyl acetate:n-hexane = 1:3, V/V) to give 8-benzyloxy-4-methoxymethyl-2-methylquinoline (123 mg) as pale yellow solid.

mp : 73.7-76.3°C

NMR (CDCl₃, δ) : 2.80 (3H, s), 3.51 (3H, s), 4.86 (2H, s), 5.45 (2H, s), 6.99 (1H, d, J=9Hz), 7.24-7.54 (8H, m)

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(2) 8-Hydroxy-4-methoxymethyl-2-methylquinoline was obtained according to a similar manner to that of Preparation 39-(6).

NMR (CDCl₃, δ) : 2.70 (3H, s), 3.53 (3H, s), 4.86 (2H, s), 7.12 (1H, d, J=8Hz), 7.29-7.44 (3H, m)

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Preparation 43

A mixture of 2-hydroxyaniline (2 g), crotonoylbenzene (8.03 g) and concentrated hydrochloric acid (8 ml) was refluxed for 24 hours. The mixture was neutralized with concentrated ammonia water under ice-cooling, and extracted with chloroform. The organic layer was washed with brine, dried over magnesium sulfate and concentrated in vacuo. The residue was purified according to a conventional manner to give 8-hydroxy-2-methyl-4-phenylquinoline (2.4 g) as an oil.

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NMR (CDCl₃, δ) : 2.75 (3H, s), 7.14 (1H, m), 7.27-7.36

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(2H, m), 7.40-7.61 (6H, m), 7.95 (1H, d, J=8Hz)

Preparation 44

The following compounds were obtained according to a similar manner to that of Preparation 27-(5).

(1) 6-Hydroxymethyl-3,4-dihydro-2(1H)-quinoline (from methyl 3,4-dihydro-2(1H)-quinolinone-6-carboxylate)

mp : 148-173°C

NMR (CDCl₃, δ) : 2.61 (2H, t, J=7.5Hz), 2.96 (2H, t, J=7.5Hz), 4.61 (2H, s), 6.74 (1H, d, J=8Hz), 7.14-7.22 (2H, m)

(2) 5-Hydroxymethyl-2-[(E)-2-(4-pyridyl)vinyl]pyridine (from methyl 2-[(E)-2-(4-pyridyl)vinyl]pyridine-5-carboxylate)

mp : >198.9°C

NMR (CDCl₃, δ) : 4.73 (2H, s), 7.34 (1H, d, J=16Hz), 7.40-7.49 (3H, m), 7.53 (1H, d, J=16Hz), 8.53-8.65 (3H, m)

Preparation 45

(1) To a solution of methyl 3,4-dihydro-2(1H)-quinolinone-6-carboxylate (500 mg) in tetrahydrofuran was dropwise added 2M solution of borane-methyl sulfide complex in tetrahydrofuran (2.5 ml) under ice-cooling, and the mixture was refluxed for 45 minutes. After cooling, methanol (1 ml) was dropwise added thereto, and the mixture was stirred for 1 hour. The solvent was removed, and ethyl acetate and water were added to the residue. The organic layer was washed with water, saturated sodium bicarbonate solution and brine, dried over magnesium sulfate and concentrated in vacuo. The residue was pulverized with diisopropyl ether - n-hexane to give methyl 1,2,3,4-tetrahydroquinoline-6-carboxylate (385 mg) as solid.

mp : 75-84°C

NMR (CDCl₃, δ) : 2.93 (2H, quint, J=7Hz), 2.76 (2H, t,

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J=7Hz), 3.33 (2H, t, J=7Hz), 3.83 (3H, s), 4.29 (1H, br s), 6.39 (1H, d, J=8Hz), 7.59-7.68 (2H, m)

(2) 6-Hydroxymethyl-1,2,3,4-tetrahydroquinoline was obtained according to a similar manner to that of Preparation 27-(5).

NMR (CDCl₃, δ) : 1.53 (1H, t, J=6Hz), 1.90 (2H, quint, J=7Hz), 2.73 (2H, t, J=7Hz), 3.28 (2H, t, J=7Hz), 4.49 (2H, d, J=6Hz), 6.44 (1H, d, J=8Hz), 6.90-7.00 (2H, m)

(3) To a solution of 6-hydroxymethyl-1,2,3,4-tetrahydroquinoline (314 mg) in methanol (4 ml) was dropwise added acetic anhydride (589 mg) under ice-cooling, and the mixture was stirred for 1 hour at the same temperature. The solvent was removed in vacuo, and ethyl acetate and saturated sodium bicarbonate solution was added to the residue. The organic layer was washed with water and brine, dried and concentrated in vacuo. The residue was purified by preparative thin-layer chromatography (n-hexane:ethyl acetate = 1:2, V/V) to give 1-acetyl-6-hydroxymethyl-1,2,3,4-tetrahydroquinoline (227 mg) as powder.

mp : 95-106°C

NMR (CDCl₃, δ) : 1.70 (1H, t-like), 1.96 (2H, quint, J=7Hz), 2.24 (3H, s), 2.75 (2H, t, J=7Hz), 3.80 (2H, t, J=7Hz), 4.67 (2H, d, J=6Hz), 6.96-7.36 (3H, m)

Preparation 46

(1) A mixture of 3-methoxy-4-nitrobenzyl alcohol (1.0 g) and 10% palladium on carbon (100 mg) in methanol was stirred for 2 hours under 3 atmospheric pressure of hydrogen. After filtration, the filtrate was concentrated in vacuo to give 4-amino-3-methoxybenzyl alcohol (910 mg) as an oil.

NMR (CDCl₃, δ) : 3.77 (2H, br s), 3.84 (3H, s), 4.56 (2H, s), 6.66 (1H, d, J=8Hz), 6.76 (1H, d, J=8Hz),

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6.81 (1H, s)

(2) To a solution of 4-amino-3-methoxybenzyl alcohol (900 mg) in methanol was added acetic anhydride (1.8 g) under ice cooling, and the mixture was stirred for 1 hour at the same temperature. After evaporation, the residue was dissolved in ethyl acetate, and the solution was washed with sodium bicarbonate solution, water and brine, dried over magnesium sulfate and concentrated in vacuo to give 4-acetamido-3-methoxybenzyl alcohol (840 mg) as solid.

mp : 104°C

NMR (CDCl₃, δ) : 1.69 (1H, t, J=5Hz), 2.20 (3H, s), 3.90 (3H, s), 4.65 (2H, d, J=5Hz), 6.88-6.97 (2H, m), 7.74 (1H, br s), 8.32 (1H, d, J=8Hz)

Preparation 47

The following compounds were obtained according to a similar manner to that of Preparation 32-(7).

(1) 6-Formyl-3,4-dihydro-2(1H)-quinoline

mp : 207°C

NMR (CDCl₃, δ) : 2.70 (2H, t, J=7.5Hz), 3.07 (2H, t, J=7.5Hz), 6.90 (1H, d, J=8Hz), 7.68-7.75 (2H, m), 9.89 (1H, s)

(2) 1-Acetyl-6-formyl-1,2,3,4-tetrahydroquinoline

NMR (CDCl₃, δ) : 2.01 (2H, quint, J=7Hz), 2.29 (3H, s), 2.82 (2H, t, J=7Hz), 3.81 (2H, t, J=7Hz), 7.46-7.60 (1H, brpeak), 7.65-7.74 (2H, m), 9.93 (1H, s)

(3) 4-Acetamido-3-methoxybenzaldehyde

mp : 145°C

NMR (CDCl₃, δ) : 2.25 (3H, s), 3.97 (3H, s), 7.41 (1H, d, J=2Hz), 7.48 (1H, dd, J=2, 8Hz), 7.99 (1H, br s), 8.59 (1H, d, J=8Hz), 9.88 (1H, s)

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(4) 5-Formyl-2-[(E)-2-(4-pyridyl)vinyl]pyridine

mp : 131-136°C

NMR (CDCl₃, δ) : 7.40 (1H, d, J=16Hz), 7.47 (2H, d, J=6Hz), 7.56 (1H, d, J=8Hz), 7.78 (1H, d, J=16Hz), 8.19 (1H, dd, J=2, 8Hz), 8.65 (2H, d, J=6Hz), 9.07 (1H, d, J=2Hz), 10.12 (1H, s)

(5) 5-Formyl-2-[(E)-2-(3-pyridyl)vinyl]pyridine (from 5-hydroxymethyl-2-[(E)-2-(3-pyridyl)vinyl]pyridine)

NMR (CDCl₃, δ) : 7.29 (1H, d, J=16Hz), 7.35 (1H, dd, J=5, 8Hz), 7.54 (1H, d, J=8Hz), 7.85 (1H, d, J=16Hz), 7.93 (1H, ddd, J=2, 2, 8Hz), 8.18 (1H, dd, J=2, 8Hz), 8.58 (1H, d, J=5Hz), 8.83 (1H, d, J=2Hz), 9.06 (1H, d, J=2Hz), 10.10 (1H, s)

Preparation 48

The following compounds were obtained according to a similar manner to that of Preparation 1.

(1) Methyl (E)-3-(2-oxo-1,2,3,4-tetrahydroquinolin-6-yl)acrylate

NMR (CDCl₃, δ) : 2.66 (2H, t, J=7.5Hz), 3.00 (2H, t, J=7.5Hz), 3.80 (3H, s), 6.35 (1H, d, J=16Hz), 6.75 (1H, d, J=8Hz), 7.31-7.39 (2H, m), 7.80 (1H, br s)

(2) Methyl (E)-3-(1-acetyl-1,2,3,4-tetrahydroquinolin-6-yl)acrylate

NMR (CDCl₃, δ) : 1.97 (2H, quint, J=7Hz), 2.25 (3H, s), 2.75 (2H, t, J=7Hz), 3.79 (2H, t, J=7Hz), 3.80 (3H, s), 6.38 (1H, d, J=16Hz), 7.27-7.33 (4H, m)

(3) Methyl 4-acetamido-3-methoxycinnamate

mp : 137°C

NMR (CDCl₃, δ) : 2.21 (3H, s), 3.80 (3H, s), 3.93 (3H, s), 6.36 (1H, d, J=16Hz), 7.01 (1H, s), 7.14

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(1H, d, J=8Hz), 7.63 (1H, d, J=16Hz), 7.83 (1H, br s), 8.40 (1H, d, J=8Hz)

- 5 (4) Methyl (E)-3-(3-quinolyl)acrylate (from 3-quinolinecarbaldehyde)

mp : 122°C

10 NMR (CDCl₃, δ) : 3.87 (3H, s), 6.68 (1H, d, J=16Hz), 7.60 (1H, t, J=8Hz), 7.78 (1H, t, J=8Hz), 7.81-7.90 (2H, m), 8.12 (1H, d, J=8Hz), 8.25 (1H, d, J=2Hz), 9.10 (1H, d, J=2Hz)

- (5) Methyl (E)-3-[6-[(E)-2-(4-pyridyl)vinyl]pyridin-3-yl]acrylate

mp : >143.2°C

15 NMR (CDCl₃, δ) : 3.83 (3H, s), 6.53 (1H, d, J=16Hz), 7.34 (1H, d, J=16Hz), 7.40-7.47 (3H, m), 7.64 (1H, d, J=16Hz), 7.70 (1H, d, J=16Hz), 7.87 (1H, d, J=8Hz), 8.63 (2H, d, J=6Hz), 8.75 (1H, d, J=2Hz)

- 20 (6) Methyl (E)-3-[6-[(E)-2-(2-pyridyl)vinyl]pyridin-3-yl]acrylate (from 5-formyl-2-[(E)-2-(2-pyridyl)vinyl]pyridine)

25 NMR (CDCl₃, δ) : 3.83 (3H, s), 6.52 (1H, d, J=16Hz), 7.22 (1H, dd, J=5, 8Hz), 7.45 (2H, d, J=8Hz), 7.65-7.77 (4H, m), 7.84 (1H, dd, J=2, 8Hz), 8.64 (1H, d, J=5Hz), 8.75 (1H, d, J=2Hz)

- (7) Methyl (E)-3-[6-[(E)-2-(3-pyridyl)vinyl]pyridin-3-yl]acrylate

30 NMR (CDCl₃, δ) : 3.82 (3H, s), 6.51 (1H, d, J=16Hz), 7.23 (1H, d, J=16Hz), 7.32 (1H, dd, J=5, 8Hz), 7.41 (1H, d, J=8Hz), 7.60 (1H, d, J=16Hz), 7.61 (1H, d, J=16Hz), 7.85 (1H, dd, J=2, 8Hz), 7.90 (1H, ddd, J=2, 2, 8Hz), 8.54 (1H, d, J=5Hz), 8.73 (1H, d, J=2Hz), 8.81 (1H, d, J=2Hz)

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Preparation 49

The following compounds were obtained according to a similar manner to that of Preparation 3.

- 5 (1) (E)-3-(2-Oxo-1,2,3,4-tetrahydroquinolin-6-yl)acrylic acid
mp : >250°C
NMR (DMSO-d₆, δ) : 2.46 (2H, t, J=7.5Hz), 2.90 (2H, t, J=7.5Hz), 6.40 (1H, d, J=16Hz), 6.86 (1H, d, J=8Hz), 7.41-7.57 (3H, m)
- 10 (2) (E)-3-(1-Acetyl-1,2,3,4-tetrahydroquinolin-6-yl)acrylic acid
NMR (DMSO-d₆, δ) : 1.85 (2H, quint, J=7Hz), 2.17 (3H, s), 2.73 (2H, t, J=7Hz), 3.68 (2H, t, J=7Hz), 6.46 (1H, d, J=16Hz), 7.41-7.63 (4H, m)
- 15 (3) 4-Acetamido-3-methoxycinnamic acid
mp : 221.5-230°C
NMR (DMSO-d₆, δ) : 2.10 (3H, s), 3.89 (3H, s), 6.52 (1H, d, J=16Hz), 7.20 (1H, d, J=8Hz), 7.38 (1H, s-like), 7.53 (1H, d, J=16Hz), 8.07 (1H, d, J=8Hz), 9.26 (1H, s)
- 20 (4) (E)-3-(3-Quinolyl)acrylic acid
NMR (DMSO-d₆, δ) : 6.85 (1H, d, J=16Hz), 7.66 (1H, t, J=8Hz), 7.72-7.86 (2H, m), 7.96-8.06 (2H, m), 8.69 (1H, d, J=2Hz), 9.23 (1H, d, J=2Hz)
- 25 (5) (E)-3-[6-[(E)-2-(4-Pyridyl)vinyl]pyridin-3-yl]acrylic acid
mp : >250°C
NMR (DMSO-d₆, δ) : 6.71 (1H, d, J=16Hz), 7.56-7.77 (6H, m), 8.20 (1H, dd, J=2, 8Hz), 8.59 (2H, d, J=6Hz), 8.88 (1H, d, J=2Hz)
- 30
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(6) (E)-3-[6-[(E)-2-(2-Pyridyl)vinyl]pyridin-3-yl]acrylic acid

5 NMR (DMSO-d₆, δ) : 6.70 (1H, d, J=16Hz), 7.33 (1H, dd, J=5, 8Hz), 7.59-7.72 (3H, m), 7.78 (1H, d, J=2Hz), 7.83 (2H, ddd, J=2, 8, 8Hz), 8.19 (1H, dd, J=2, 8Hz), 8.62 (1H, d, J=5Hz), 8.88 (1H, d, J=2Hz)

(7) (E)-3-[6-[(E)-2-(3-Pyridyl)vinyl]pyridin-3-yl]acrylic acid

10 NMR (DMSO-d₆, δ) : 6.69 (1H, d, J=17Hz), 7.43 (1H, dd, J=5, 8Hz), 7.49 (1H, d, J=16Hz), 7.60 (1H, d, J=8Hz), 7.64 (1H, d, J=16Hz), 7.78 (1H, d, J=17Hz), 8.09-8.22 (2H, m), 8.50 (1H, d, J=5Hz), 8.85 (1H, s-like)

15

Example 43

(1) 2,4-Dimethyl-8-[2,6-dimethyl-3-[N-(phthalimidoacetyl)-N-methylamino]benzyloxy]quinoline was obtained by reacting 8-hydroxy-2,4-dimethylquinoline with a mixture of 2,6-dimethyl-1-methanesulfonyloxymethyl-3-[N-methyl-N-(phthalimidoacetyl)amino]benzene and 1-chloromethyl-2,6-dimethyl-3-[N-methyl-N-(phthalimidoacetyl)amino]benzene according to a similar manner to that of Preparation 6.

25 mp : 123-125°C
NMR (CDCl₃, δ) : 2.50 (3H, s), 2.58 (3H, s), 2.65 (3H, s), 2.68 (3H, s), 3.22 (3H, s), 3.94 (1H, d, J=17Hz), 4.19 (1H, d, J=17Hz), 5.38 (1H, d, J=10Hz), 5.42 (1H, d, J=10Hz), 7.15 (1H, br s), 7.19-7.28 (3H, m), 7.42 (1H, t, J=8Hz), 7.61 (1H, d, J=8Hz), 7.67-7.74 (2H, m), 7.80-7.88 (2H, m)

30

(2) 8-[3-(N-Glycyl-N-methylamino)-2,6-dimethylbenzyloxy]-2,4-dimethylquinoline was obtained according to a similar manner to that of Preparation 11.

35 mp : 145-148°C

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NMR (CDCl₃, δ) : 2.32 (3H, s), 2.52 (3H, s), 2.65 (3H, s), 2.68 (3H, s), 2.93 (1H, d, J=17Hz), 3.15 (1H, d, J=17Hz), 3.21 (3H, s), 5.34 (2H, s), 7.02 (1H, d, J=8Hz), 7.10-7.18 (2H, m), 7.22 (1H, d, J=8Hz), 7.42 (1H, t, J=8Hz), 7.61 (1H, d, J=8Hz)

(3) 2,4-Dimethyl-8-[2,6-dimethyl-3-[N-methyl-N-[N'-(3-[(4-pyridyl)carbamoyl]phenyl)ureidoacetyl]amino]benzyloxy]-quinoline was obtained by reacting 8-[3-(N-glycyl-N-methylamino)-2,6-dimethylbenzyloxy]-2,4-dimethylquinoline with phenyl 3-[(4-pyridyl)carbamoyl]phenylcarbamate according to a similar manner to that of Example 19.

NMR (CDCl₃, δ) : 2.32 (3H, s), 2.53 (3H, s), 2.64 (3H, s), 2.68 (3H, s), 3.23 (3H, s), 3.93 (2H, br s), 5.09 (1H, br d, J=10Hz), 5.25 (1H, d, J=10Hz), 6.66 (1H, br s), 6.72 (1H, br s), 6.98-7.08 (3H, m), 7.15 (1H, br s), 7.20 (1H, br d, J=8Hz), 7.29 (1H, br d, J=8Hz), 7.46-7.55 (2H, m), 7.65 (1H, d, J=8Hz), 7.90 (2H, d, J=7.5Hz), 8.43 (2H, d, J=7.5Hz), 8.51 (1H, br s), 9.75 (1H, br s)

its dihydrochloride

NMR (CDCl₃-CD₃OD, δ) : 2.32 (3H, s), 2.47 (3H, s), 2.93 (6H, br s), 3.27 (3H, s), 3.80 (2H, br s), 5.39 (1H, br d, J=10Hz), 5.50 (1H, br d, J=10Hz), 7.19-7.30 (3H, m), 7.53 (1H, br d, J=8Hz), 7.63 (2H, br d, J=8Hz), 7.71 (1H, br s), 7.78-7.89 (2H, m), 7.91 (1H, br s), 8.42-8.52 (4H, m)

30 Example 44

(1) 2-Methyl-8-[2-methyl-3-nitrobenzyloxy]quinoline was obtained according to a similar manner to that of Preparation 6.

mp : 184-188°C

35 NMR (CDCl₃, δ) : 2.56 (3H, s), 2.80 (3H, s), 5.48 (2H,

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s), 7.00 (1H, d, J=8Hz), 7.28-7.44 (4H, m), 7.74 (1H, d, J=8Hz), 7.82 (1H, d, J=8Hz), 8.04 (1H, d, J=8Hz)

- 5 (2) 8-[3-Amino-2-methylbenzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Preparation 8.
mp : 223-227°C
NMR (CDCl₃, δ) : 2.23 (3H, s), 2.79 (3H, s), 3.66 (2H, br s), 5.41 (2H, s), 6.68 (1H, br d, J=8Hz), 6.92-
10 7.05 (3H, m), 7.24-7.38 (3H, m), 8.00 (1H, d, J=8Hz)
- 15 (3) 2-Methyl-8-[2-methyl-3-(phthalimidoacetyl)-benzyloxy]quinoline was obtained according to a similar manner to that of Preparation 9.
mp : 283-285°C
NMR (DMSO-d₆, δ) : 2.27 (3H, s), 2.65 (3H, s), 4.48 (2H, s), 5.30 (2H, s), 7.20 (1H, t, J=8Hz), 7.26-
20 7.34 (4H, m), 7.85-7.98 (4H, m), 8.20 (1H, d, J=8Hz), 9.85 (1H, br s)
- 25 (4) 2-Methyl-8-[2-methyl-3-[N-(phthalimidoacetyl)-N-methylamino]benzyloxy]quinoline was obtained according to a similar manner to that of Preparation 10.
mp : 158-161°C
NMR (CDCl₃, δ) : 2.47 (3H, s), 2.80 (3H, s), 3.26 (3H, s), 3.92 (1H, d, J=17Hz), 4.19 (1H, d, J=17Hz),
30 5.46 (2H, s), 7.06 (1H, br d, J=8Hz), 7.23-7.42 (5H, m), 7.65-7.75 (3H, m), 7.81-7.89 (2H, m), 8.03 (1H, d, J=8Hz)
- 35 (5) 8-[3-(N-Glycyl-N-methylamino)-2-methylbenzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Preparation 11.

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NMR (CDCl₃, δ) : 2.29 (3H, s), 2.80 (3H, s), 2.90 (1H, d, J=17Hz), 3.13 (1H, d, J=17Hz), 3.24 (3H, s), 5.40 (2H, s), 7.01 (1H, br d, J=8Hz), 7.09 (1H, br d, J=8Hz), 7.21-7.43 (4H, m), 7.60 (1H, br d, J=8Hz), 8.03 (1H, d, J=8Hz)

Example 45

(1) 2,4-Dimethyl-8-[3-[N-(phthalimidoacetyl)-N-methylamino]-2,4,6-trimethylbenzyloxy]quinoline was obtained by reacting 8-hydroxy-2,4-dimethylquinoline with a mixture of 1-methanesulfonyloxymethyl-3-[N-methyl-N-(phthalimidoacetyl)-amino]-2,4,6-trimethylbenzene and 1-chloromethyl-3-[N-methyl-N-(phthalimidoacetyl)amino]-2,4,6-trimethylbenzene according to a similar manner to that of Preparation 6.

mp : 204-206°C

NMR (CDCl₃, δ) : 2.37 (3H, s), 2.47 (3H, s), 2.51 (3H, s), 2.64 (3H, s), 2.68 (3H, s), 3.18 (3H, s), 3.98 (2H, s), 5.32 (1H, d, J=10Hz), 5.39 (1H, d, J=10Hz), 7.10 (1H, s), 7.15 (1H, s), 7.14 (1H, d, J=8Hz), 7.41 (1H, t, J=8Hz), 7.60 (1H, d, J=8Hz), 7.68-7.74 (2H, m), 7.81-7.89 (2H, m)

(2) 8-[3-(N-Glycyl-N-methylamino)-2,4,6-trimethylbenzyloxy]-2,4-dimethylquinoline was obtained according to a similar manner to that of Preparation 11.

NMR (CDCl₃, δ) : 2.18 (3H, s), 2.29 (3H, s), 2.49 (3H, s), 2.65 (3H, s), 2.68 (3H, s), 2.95 (2H, s), 3.16 (3H, s), 5.31 (2H, s), 7.02 (1H, s), 7.13 (1H, s), 7.21 (1H, d, J=8Hz), 7.41 (1H, t, J=8Hz), 7.60 (1H, d, J=8Hz)

Example 46

(1) 8-[2,6-Dimethoxy-3-nitrobenzyloxy]-2-methylquinoline was obtained by reacting 8-hydroxy-2-methylquinoline with a mixture of 2,6-dimethoxy-3-nitrobenzyl methanesulfonate and

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2,6-dimethoxy-3-nitrobenzyl chloride according to a similar manner to that of Preparation 6.

mp : 192-196°C

5 NMR (CDCl₃, δ) : 2.68 (3H, s), 3.91 (3H, s), 4.08 (3H, s), 5.40 (2H, s), 6.78 (1H, d, J=8Hz), 7.22-7.31 (2H, m), 7.37-7.46 (2H, m), 8.00 (1H, d, J=8Hz), 8.09 (1H, d, J=8Hz)

10 (2) To a mixture of 8-[2,6-dimethoxy-3-nitrobenzyloxy]-2-methylquinoline (2.28 g), ferric chloride (68 mg), carbon (68 mg) and methanol (34 ml) was added hydrazine monohydrate (1.25 ml) at 60°C, and the mixture was refluxed for 4 hours. Ferric chloride (68 mg), carbon (68 mg), hydrazine monohydrate (1.25 ml) and methanol (10 ml) was further added, 15 and the mixture was refluxed overnight. Insoluble materials were filtered off, and the filtrate was concentrated. The residue was dissolved in chloroform, and the solution was washed with saturated sodium bicarbonate solution, water and brine, dried over magnesium sulfate and concentrated. The 20 residue was purified by silica gel column chromatography (chloroform-methanol) and crystallized with methanol to give 8-[3-amino-2,6-dimethoxybenzyloxy]-2-methylquinoline (1.33 g) as pale brown crystals.

mp : 208-210°C

25 NMR (CDCl₃, δ) : 2.27 (3H, s), 2.37 (3H, s), 2.72 (3H, s), 3.57 (2H, br s), 5.32 (2H, s), 6.67 (1H, d, J=8Hz), 6.91 (1H, d, J=8Hz), 7.18-7.31 (2H, m), 7.36-7.42 (2H, m), 8.00 (1H, d, J=8Hz)

30 (3) 8-[2,6-Dimethoxy-3-(phthalimidoacetylamino)benzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Preparation 9.

mp : 229-231°C

35 NMR (CDCl₃, δ) : 2.70 (3H, s), 3.79 (3H, s), 3.94 (3H, s), 4.55 (2H, s), 5.36 (2H, s), 6.66 (1H, d,

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J=8Hz), 7.22-7.30 (2H, m), 7.32-7.42 (2H, m), 7.71-7.79 (2H, m), 7.86-7.92 (2H, m), 7.99 (1H, d, J=8Hz), 8.08 (1H, br s), 8.19 (1H, d, J=8Hz)

- 5 (4) 8-[2,6-Dimethoxy-3-[N-(phthalimidoacetyl)-N-methylamino]benzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Preparation 10.
- mp : 184-185°C
- 10 NMR (CDCl₃, δ) : 2.70 (3H, s), 3.29 (3H, s), 3.90 (3H, s), 4.01 (3H, s), 4.22 (1H, d, J=17Hz), 4.32 (1H, d, J=17Hz), 5.44 (2H, s), 6.79 (1H, d, J=8Hz), 7.24-7.44 (5H, m), 7.69-7.75 (2H, m), 7.81-7.89 (2H, m), 8.00 (1H, d, J=8Hz)
- 15 (5) 8-[3-(N-Glycyl-N-methylamino)-2,6-dimethoxybenzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Preparation 11.
- 20 NMR (CDCl₃, δ) : 2.69 (3H, s), 3.10 (1H, d, J=17Hz), 3.22 (1H, d, J=17Hz), 3.30 (3H, s), 3.85 (6H, s), 5.33 (1H, d, J=10Hz), 5.44 (1H, d, J=10Hz), 6.72 (1H, d, J=8Hz), 7.12 (1H, d, J=8Hz), 7.21-7.45 (4H, m), 8.00 (1H, d, J=8Hz)

Example 47

- 25 (1) 2,4-Dimethyl-8-[2,6-dimethyl-3-[N-ethyl-N-(phthalimidoacetyl)amino]benzyloxy]quinoline was obtained by reacting 8-hydroxy-2,4-dimethylquinoline with a mixture of 2,6-dimethyl-1-methanesulfonyloxymethyl-3-[N-ethyl-N-(phthalimidoacetyl)amino]benzene and 1-chloromethyl-2,6-
- 30 dimethyl-3-[N-ethyl-N-(phthalimidoacetyl)amino]benzene according to a similar manner to that of Preparation 6.
- 35 NMR (CDCl₃, δ) : 1.15 (3H, t, J=7.5Hz), 2.50 (3H, s), 2.58 (3H, s), 2.65 (3H, s), 2.68 (3H, s), 3.28 (1H, m), 3.90 (1H, d, J=17Hz), 4.05-4.19 (2H, m), 5.40 (2H, s), 7.14 (1H, br s), 7.20 (2H, s), 7.25 (1H,

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d, J=8Hz), 7.42 (1H, t, J=8Hz), 7.61 (1H, d, J=8Hz), 7.67-7.73 (2H, m), 7.80-7.88 (2H, m)

(2) 8-[3-(N-Glycyl-N-ethylamino)-2,6-dimethylbenzyloxy]-2,4-dimethylquinoline was obtained according to a similar manner to that of Preparation 11.

NMR (CDCl₃, δ) : 1.15 (3H, t, J=7.5Hz), 2.32 (3H, s), 2.52 (3H, s), 2.65 (3H, s), 2.67 (3H, s), 2.89 (1H, d, J=17Hz), 3.11 (1H, d, J=17Hz), 3.25 (1H, m), 4.14 (1H, m), 5.35 (2H, s), 6.99 (1H, d, J=8Hz), 7.10-7.17 (2H, m), 7.22 (1H, d, J=8Hz), 7.42 (1H, t, J=8Hz), 7.61 (1H, d, J=8Hz)

Example 48

(1) 8-[2,6-Dimethyl-3-[N-(phthalimidoacetyl)-N-methylamino]benzyloxy]-2-methylquinoxaline was obtained by reacting 8-hydroxy-2-methylquinoxaline with a mixture of 2,6-dimethyl-1-methanesulfonyloxymethyl-3-[N-methyl-N-(phthalimidoacetyl)amino]benzene and 1-chloromethyl-2,6-dimethyl-3-[N-methyl-N-(phthalimidoacetyl)amino]benzene according to a similar manner to that of Preparation 6.

mp : 124-127°C

NMR (CDCl₃, δ) : 2.50 (3H, s), 2.54 (3H, s), 2.76 (3H, s), 3.22 (3H, s), 3.96 (1H, d, J=17Hz), 4.20 (1H, d, J=17Hz), 5.37 (1H, d, J=10Hz), 7.20-7.35 (3H, m), 7.61-7.77 (4H, m), 7.81-7.89 (2H, m), 8.74 (1H, s)

(2) 8-[3-(N-Glycyl-N-methylamino)-2,6-dimethylbenzyloxy]-2-methylquinoxaline was obtained according to a similar manner to that of Preparation 11.

NMR (CDCl₃, δ) : 2.32 (3H, s), 2.51 (3H, s), 2.78 (3H, s), 2.68 (3H, s), 2.93 (1H, d, J=17Hz), 3.16 (1H, d, J=17Hz), 3.22 (3H, s), 5.34 (2H, s), 7.06 (1H, d, J=8Hz), 7.16 (1H, d, J=8Hz), 7.29 (1H, d,

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J=8Hz), 7.65 (1H, t, J=8Hz), 7.76 (1H, d, J=8Hz),
8.74 (1H, s)

Example 49

5 The following compounds were obtained according to a
similar manner to that of Example 9.

(1) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)-
cinnamoylglycyl]amino]benzyloxy]-2,4-dimethylquinoline

10 NMR (CDCl₃, δ) : 2.65 (3H, s), 3.00 (3H, d, J=5Hz),
3.26 (3H, s), 3.66 (1H, dd, J=17, 4Hz), 3.93 (1H,
dd, J=17, 5Hz), 5.61 (1H, d, J=10Hz), 5.66 (1H, d,
J=10Hz), 6.32 (1H, br d, J=5Hz), 6.52 (1H, d,
J=15Hz), 6.72 (1H, br s), 7.14 (1H, s), 7.22-7.32
15 (2H, m), 7.39-7.66 (6H, m), 7.74 (2H, d, J=8Hz)

its hydrochloride

NMR (CDCl₃-CD₃OD, δ) : 2.95 (3H, s), 2.99 (3H, s),
3.07 (3H, br s), 3.28 (3H, s), 3.89 (1H, d,
20 J=17Hz), 4.20 (1H, d, J=17Hz), 5.58 (1H, d,
J=10Hz), 5.67 (1H, d, J=10Hz), 6.68 (1H, d,
J=15Hz), 7.35 (1H, d, J=15Hz), 7.40-7.62 (5H, m),
7.67-7.76 (3H, m), 7.79-7.90 (2H, m)

25 (2) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)-
cinnamoylglycyl]amino]benzyloxy]-2,3-dimethylquinoline

NMR (CDCl₃, δ) : 2.43 (3H, s), 2.66 (3H, s), 3.00 (3H,
d, J=5Hz), 3.27 (3H, s), 3.65 (1H, dd, J=17, 4Hz),
3.94 (1H, dd, J=17, 5Hz), 5.63 (2H, s), 6.27 (1H,
30 br d, J=5Hz), 6.52 (1H, d, J=15Hz), 6.69 (1H, br
s), 7.17-7.32 (2H, m), 7.36-7.41 (2H, m), 7.45-7.62
(4H, m), 7.74 (2H, d, J=8Hz), 7.81 (1H, br s)

its hydrochloride

35 NMR (CDCl₃-CD₃OD, δ) : 2.63 (3H, br s), 3.00 (3H, s),

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3.10 (3H, br s), 3.29 (3H, s), 3.89 (1H, d, J=17Hz), 4.22 (1H, d, J=17Hz), 5.60 (1H, d, J=10Hz), 5.69 (1H, d, J=10Hz), 6.69 (1H, d, J=15Hz), 7.34-7.61 (7H, m), 7.67-7.89 (3H, m), 8.63 (1H, br s)

(3) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)-cinnamoylglycyl]amino]benzyloxy]-2,3-dimethyl-4-ethoxyquinoline

10 NMR (CDCl₃, δ) : 1.52 (3H, t, J=7.5Hz), 2.35 (3H, s), 2.65 (3H, s), 3.00 (3H, d, J=5Hz), 3.27 (3H, s), 3.66 (1H, dd, J=17, 4Hz), 3.94 (1H, dd, J=17, 5Hz), 4.09 (2H, q, J=7.5Hz), 5.62 (2H, s), 6.28 (1H, br d, J=5Hz), 6.52 (1H, d, J=15Hz), 6.71 (1H, br t, J=5Hz), 7.19 (1H, d, J=8Hz), 7.30 (1H, d, J=8Hz), 7.39 (1H, t, J=8Hz), 7.45-7.62 (4H, m), 7.69 (1H, d, J=8Hz), 7.74 (2H, d, J=8Hz)

its hydrochloride

20 NMR (CDCl₃-CD₃OD, δ) : 1.61 (3H, t, J=7.5Hz), 2.41-2.51 (3H, overlapped with H₂O), 2.98 (3H, s), 3.01 (3H, s), 3.28 (3H, s), 3.86 (1H, d, J=17Hz), 4.26 (1H, d, J=17Hz), 4.42 (2H, q, J=7.5Hz), 5.54 (1H, d, J=10Hz), 5.68 (1H, d, J=10Hz), 6.68 (1H, d, J=15Hz), 7.38 (1H, d, J=15Hz), 7.48-7.62 (5H, m), 7.73-7.90 (4H, m)

(4) 8-[2,6-Dimethyl-3-[N-[4-(methylcarbamoyl)-cinnamoylglycyl]-N-methylamino]benzyloxy]-4-ethoxycarbonyl-2-methylquinoline

30 NMR (CDCl₃-CD₃OD, δ) : 1.47 (3H, t, J=7.5Hz), 2.35 (3H, s), 2.52 (3H, s), 2.77 (3H, s), 3.00 (3H, d, J=5Hz), 3.25 (3H, s), 3.62 (1H, dd, J=17 and 5Hz), 3.86 (1H, dd, J=17, 4Hz), 4.00 (2H, q, J=7.5Hz), 5.34 (2H, s), 6.20 (1H, br q, J=5Hz), 6.52 (1H, d,

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J=17Hz), 6.71 (1H, br t, J=5Hz), 7.06 (1H, d, J=8Hz), 7.16 (1H, d, J=8Hz), 7.20 (1H, d, J=8Hz), 7.48-7.62 (4H, m), 7.70-7.80 (3H, m), 8.31 (1H, d, J=8Hz)

5

its hydrochloride

NMR (CDCl₃-CD₃OD, δ) : 1.51 (3H, t, J=7.5Hz), 2.32 (3H, s), 2.49 (3H, s), 2.97 (3H, s), 3.17 (3H, s), s), 3.27 (3H, s), 3.81 (2H, s), 4.60 (2H, q, J=7.5Hz), 5.41 (1H, d, J=9Hz), 5.51 (1H, d, J=9Hz), 6.60 (1H, d, J=15Hz), 7.24 (2H, s), 7.46 (1H, d, J=15Hz), 7.53 (2H, d, J=8Hz), 7.70 (1H, d, J=8Hz), 7.80 (2H, d, J=8Hz), 7.92 (1H, t, J=8Hz), 8.20 (1H, s), 8.42 (1H, d, J=8Hz)

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(5) 8-[2,6-Dimethyl-3-[N-[4-(methylcarbamoyl)-cinnamoylglycyl]-N-methylamino]benzyloxy]-4-ethyl-2-methylquinoline

NMR (CDCl₃, δ) : 1.39 (3H, t, J=7.5Hz), 2.36 (3H, s), 2.52 (3H, s), 2.67 (3H, s), 2.98 (3H, d, J=7.5Hz), 3.06 (2H, q, J=7.5Hz), 3.25 (3H, s), 3.62 (1H, dd, J=17, 5Hz), 3.86 (1H, dd, J=17, 4Hz), 5.33 (2H, s), 6.25 (1H, br q, J=7.5Hz), 6.51 (1H, d, J=17Hz), 6.72 (1H, t, J=5Hz), 7.04 (1H, d, J=8Hz), 7.11-7.18 (2H, m), 7.24 (1H, d, J=8Hz), 7.44 (1H, t, J=8Hz), 7.51 (2H, d, J=9Hz), 7.55 (1H, d, J=17Hz), 7.66 (1H, d, J=8Hz), 7.74 (2H, d, J=9Hz)

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25

its hydrochloride

NMR (CDCl₃-CD₃OD, δ) : 1.50 (3H, t, J=7.5Hz), 2.30 (3H, s), 2.48 (3H, s), 2.98 (3H, s), 3.05 (3H, br d), 3.28 (3H, s), 3.34 (2H, q, J=7.5Hz), 3.80 (1H, d, J=15Hz), 3.86 (1H, d, J=15Hz), 5.39 (1H, d, J=9Hz), 5.50 (1H, d, J=9Hz), 6.63 (1H, d, J=17Hz), 7.20-7.28 (2H, m), 7.45 (1H, d, J=17Hz), 7.53 (2H,

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d, J=9Hz), 7.61-7.76 (2H, m), 7.81 (2H, d, J=9Hz),
7.84-7.95 (2H, m)

- 5 (6) 8-[2,6-Dimethyl-3-[N-[4-(methylcarbamoyl)-
cinnamoylglycyl]-N-methylamino]benzyloxy]-4-
hydroxymethyl-2-methylquinoline

NMR (CDCl₃-CD₃OD, δ) : 2.32 (3H, s), 2.50 (3H, s),
2.66 (3H, s), 2.96 (3H, s), 3.24 (3H, s), 3.65 (1H,
d, J=17Hz), 3.92 (1H, d, J=17Hz), 5.10 (1H, d,
10 J=9Hz), 5.16 (1H, d, J=9Hz), 5.31 (2H, s), 6.56
(1H, d, J=16Hz), 7.13 (1H, d, J=7.5Hz), 7.20 (1H,
d, J=7.5Hz), 7.26 (1H, d, J=8Hz), 7.39-7.58 (6H,
m), 7.64 (2H, d, J=9Hz)

- 15 its hydrochloride

NMR (CDCl₃-CD₃OD, δ) : 2.20 (3H, s), 2.50 (3H, s),
2.97 (3H, s), 3.04 (3H, s), 3.28 (3H, s), 3.74 (1H,
d, J=17Hz), 3.91 (1H, d, J=17Hz), 5.34 (2H, s),
5.37 (1H, d, J=9Hz), 5.51 (1H, d, J=9Hz), 6.66 (1H,
20 d, J=15Hz), 7.25 (1H, d, J=8Hz), 7.30 (1H, d,
J=8Hz), 7.48 (1H, d, J=15Hz), 7.52-7.62 (2H, m),
7.67-7.93 (2H, m), 8.15 (1H, s)

- 25 (7) 8-[2,6-Dimethyl-3-[N-[4-(methylcarbamoyl)-
cinnamoylglycyl]-N-methylamino]benzyloxy]-4-
methoxymethyl-2-methylquinoline

NMR (CDCl₃, δ) : 2.35 (3H, s), 2.52 (3H, s), 2.70 (3H,
s), 2.98 (3H, d, J=5Hz), 3.24 (3H, s), 3.51 (3H,
s), 3.62 (1H, dd, J=17, 5Hz), 3.86 (1H, dd, J=17,
30 4Hz), 4.87 (2H, s), 5.34 (2H, s), 6.24 (1H, br q,
J=5Hz), 6.50 (1H, d, J=15Hz), 6.73 (1H, m), 7.05
(1H, d, J=8Hz), 7.15 (1H, d, J=8Hz), 7.22-7.29 (1H,
m), 7.38 (1H, s), 7.45 (1H, t, J=8Hz), 7.49-7.60
(4H, m), 7.74 (2H, d, J=9Hz)

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its hydrochloride

NMR (CDCl₃-CD₃OD, δ) : 2.30 (3H, s), 2.49 (3H, s),
2.96 (3H, s), 3.08 (3H, s), 3.28 (3H, s), 3.66 (3H,
s), 3.80 (1H, d, J=17Hz), 3.86 (1H, d, J=17Hz),
5.13 (2H, s), 5.49 (1H, d, J=9Hz), 5.50 (1H, d,
J=9Hz), 6.62 (1H, d, J=15Hz), 7.24 (2H, s), 7.44
(1H, d, J=15Hz), 7.51 (2H, d, J=9Hz), 7.66-7.74
(2H, m), 7.80 (2H, d, J=9Hz), 7.90 (1H, d, J=9Hz),
7.99 (1H, s)

(8) 8-[2,6-Dimethyl-3-[N-[4-(methylcarbamoyl)-
cinnamoylglycyl]-N-methylamino]benzyloxy]-2-methyl-4-
phenylquinoline

NMR (CDCl₃, δ) : 2.39 (3H, s), 2.55 (3H, s), 2.74 (3H,
s), 2.99 (3H, d, J=5Hz), 3.26 (3H, s), 3.64 (1H,
dd, J=17, 4Hz), 3.88 (1H, dd, J=17, 5Hz), 5.37 (2H,
s), 6.25 (1H, br q, J=5Hz), 6.50 (1H, d, J=15Hz),
6.73 (1H, br t, J=5Hz), 7.07 (1H, d, J=7.5Hz), 7.16
(1H, d, J=7.5Hz), 7.20-7.30 (3H, m), 7.38 (1H, t,
J=7.5Hz), 7.44-7.60 (8H, m), 7.74 (2H, d, J=9Hz)

its hydrochloride

NMR (CDCl₃-CD₃OD, δ) : 2.32 (3H, s), 2.50 (3H, s),
2.96 (3H, s), 3.12 (3H, s), 3.29 (3H, s), 3.80 (1H,
d, J=17Hz), 3.87 (1H, d, J=17Hz), 5.42 (1H, d,
J=9Hz), 5.55 (1H, d, J=9Hz), 6.64 (1H, d, J=15Hz),
7.33 (1H, s), 7.40-7.88 (15H, m)

(9) 8-[2,6-Dimethyl-3-[N-methyl-N-[4-(methylcarbamoyl)-
cinnamoylglycyl]amino]benzyloxy]-2-methylquinoxaline

NMR (CDCl₃, δ) : 2.34 (3H, s), 2.51 (3H, s), 2.77 (3H,
s), 3.02 (3H, d, J=5Hz), 3.27 (3H, s), 3.65 (1H,
dd, J=17, 4Hz), 3.88 (1H, dd, J=17, 5Hz), 5.35 (2H,
s), 6.17 (1H, br d, J=5Hz), 6.53 (1H, d, J=15Hz),
6.71 (1H, br t, J=5Hz), 7.09 (1H, d, J=8Hz), 7.19

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(1H, d, J=8Hz), 7.30 (1H, d, J=8Hz), 7.51-7.61 (3H, m), 7.67 (1H, t, J=8Hz), 7.72-7.79 (3H, m), 8.75 (1H, s)

- 5 (10) 8-[3-[N-[(E)-3-(6-Acetylamino-3-yl)acryloylglycyl]-N-methylamino]-2,6-dimethylbenzyloxy]-2-methylquinoxaline
- 10 NMR (CDCl₃, δ) : 2.22 (3H, s), 2.35 (3H, s), 2.51 (3H, s), 2.77 (3H, s), 3.27 (3H, s), 3.64 (1H, dd, J=17, 5Hz), 3.87 (1H, dd, J=17, 5Hz), 5.35 (2H, s), 6.47 (1H, d, J=15Hz), 6.71 (1H, br t, J=5Hz), 7.10 (1H, d, J=8Hz), 7.19 (1H, d, J=8Hz), 7.31 (1H, d, J=8Hz), 7.51 (1H, d, J=15Hz), 7.67 (1H, t, J=8Hz), 7.76 (1H, d, J=8Hz), 7.85 (1H, d, J=8Hz), 8.07 (1H, br s), 7.21 (1H, br d, J=8Hz), 8.36 (1H, br s), 8.74 (1H, s)
- 15

Example 50

20 The following compounds were obtained according to a similar manner to that of Example 1.

- (1) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-(2-oxo-1,2,3,4-tetrahydroquinolin-6-yl)acryloylglycyl]amino]benzyloxy]-2-methylquinoline
- 25 NMR (CDCl₃, δ) : 2.63 (2H, t, J=7.5Hz), 2.72 (3H, s), 2.97 (2H, t, J=7.5Hz), 3.26 (3H, s), 3.64 (1H, dd, J=4, 18Hz), 3.94 (1H, dd, J=4, 18Hz), 5.60-5.66 (2H, m), 6.39 (1H, d, J=16Hz), 6.60 (1H, t-like), 6.71 (1H, d, J=8Hz), 7.18-7.54 (9H, m), 7.71 (1H, br s), 8.02 (1H, d, J=8Hz)
- 30

its hydrochloride

- 35 NMR (DMSO-d₆, δ) : 2.48 (2H, t, J=7.5Hz), 2.90 (2H, t, J=7.5Hz), 2.92 (3H, s), 3.15 (3H, s), 3.58 (1H, dd, J=4, 16Hz), 3.87 (1H, dd, J=4, 16Hz), 5.56-5.70

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(2H, m), 6.65 (1H, d, J=16Hz), 6.87 (1H, d, J=8Hz),
7.29 (1H, d, J=16Hz), 7.31-7.42 (2H, m), 7.75-8.00
(6H, m), 8.21 (1H, t-like) 8.96 (1H, brpeak), 10.26
(1H, s)

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(2) 8-[3-[N-[(E)-3-(1-Acetyl-1,2,3,4-tetrahydroquinolin-6-yl)acryloylglycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline

NMR (CDCl₃, δ) : 1.97 (2H, quint, J=7Hz), 2.24 (3H, s), 2.68-2.77 (5H, m), 3.26 (3H, s), 3.64 (1H, dd, J=4, 16Hz), 3.78 (2H, t, J=7Hz), 3.94 (1H, dd, J=4, 16Hz), 5.59-5.70 (2H, m), 6.42 (1H, d, J=16Hz), 6.60 (1H, t-like), 7.21-7.36 (6H, m), 7.36-7.56 (6H, m), 8.03 (8H, d)

15

its hydrochloride

NMR (DMSO-d₆, δ) : 1.86 (2H, quint, J=7Hz), 2.19 (3H, s), 2.72 (2H, t, J=7Hz), 2.91 (3H, s), 3.15 (3H, s), 3.59 (1H, dd, J=4, 16Hz), 3.67 (2H, t, J=7Hz), 3.89 (2H, t, J=7Hz), 5.57-5.77 (2H, m), 6.73 (1H, d, J=16Hz), 7.27-7.43 (2H, m), 7.50-7.61 (1H, brpeak), 7.77-8.00 (7H, m), 8.27 (1H, t, J=6Hz), 8.90-9.03 (1H, m)

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25 (3) 8-[3-[N-(4-Acetamido-3-methoxycinnamoylglycyl)-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline

NMR (CDCl₃, δ) : 2.20 (3H, s), 2.73 (3H, s), 3.26 (3H, s), 3.84-4.00 (4H, m), 5.60-5.71 (2H, m), 6.40 (1H, d, J=16Hz), 6.60 (1H, brpeak), 6.98 (1H, s-like), 7.12 (1H, d, J=8Hz), 7.20-7.34 (3H, m), 7.34-7.55 (4H, m), 7.81 (1H, br s), 8.02 (1H, d, J=8Hz), 8.37 (1H, d, J=8Hz)

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its hydrochloride

35 NMR (DMSO-d₆, δ) : 2.09 (3H, s), 2.89 (3H, s), 3.15

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(3H, s), 3.86 (3H, s), 5.56-5.69 (2H, m), 6.75 (1H, d, J=16Hz), 7.10 (1H, d, J=8Hz), 7.21 (1H, s-like), 7.32 (1H, d, J=16Hz), 7.72-7.96 (6H, m), 8.03 (1H, d, J=8Hz), 8.20 (1H, t-like), 8.93 (1H, brpeak), 9.23 (1H, s-like)

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(4) 8-[2,6-Dichloro-3-[N-methyl-N-(3-methyl-4-nitrocinnamoylglycyl)amino]benzyloxy]-2-methylquinoline
NMR (CDCl₃, δ) : 2.59 (3H, s), 2.72 (3H, s), 3.25 (3H, s), 3.68 (1H, dd, J=4, 16Hz), 3.94 (1H, dd, J=4, 16Hz), 5.60-5.70 (2H, m), 6.58 (1H, d, J=16Hz), 6.71 (1H, t-like), 7.22-7.33 (3H, m), 7.35-7.51 (5H, m), 7.55 (1H, d, J=16Hz) 7.98 (1H, d, J=8Hz), 8.03 (1H, d, J=8Hz)

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(5) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-(3-quinolyl)-acryloylglycyl]amino]benzyloxy]-2-methylquinoline
NMR (DMSO-d₆, δ) : 2.73 (3H, s), 3.28 (3H, s), 3.72 (1H, dd, J=5, 16Hz), 3.96 (1H, dd, J=5, 16Hz), 5.59-5.71 (2H, m), 6.66-6.80 (2H, m), 7.21-7.36 (3H, m), 7.36-7.61 (4H, m), 7.67-7.86 (3H, m), 8.02 (1H, d, J=8Hz), 8.09 (1H, d, J=8Hz), 8.20 (1H, s-like), 9.07 (1H, d, J=2Hz)

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25

its dihydrochloride

NMR (DMSO-d₆, δ) : 2.91 (3H, s), 3.17 (3H, s), 3.62 (1H, dd, J=5, 17Hz), 3.92 (1H, dd, J=5, 17Hz), 5.62 (1H, d, J=10Hz), 5.69 (1H, d, J=10Hz), 7.13 (1H, d, J=16Hz), 7.63 (1H, d, J=16Hz), 7.69-8.01 (8H, m), 8.07-8.17 (2H, m), 8.45 (1H, t, J=6Hz), 8.74 (1H, s-like), 8.90-9.02 (1H, m), 9.24 (1H, s-like)

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(6) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-[(E)-2-(4-pyridyl)vinyl]pyridin-3-yl]acryloylglycyl]amino]benzyloxy]-2-methylquinoline

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NMR (CDCl₃, δ) : 2.74 (3H, s), 3.28 (3H, s), 3.68 (1H, dd, J=4, 16Hz), 3.95 (1H, dd, J=4, 16Hz), 5.61-5.71 (2H, m), 6.58 (1H, d, J=16Hz), 6.72 (1H, t-like), 7.23-7.66 (12H, m), 7.82 (1H, dd, J=2, 8Hz), 8.03 (1H, d, J=8Hz), 8.62 (2H, d, J=6Hz), 8.73 (1H, d, J=2Hz)

its trihydrochloride

NMR (DMSO-d₆, δ) : 2.90 (3H, s), 3.15 (3H, s), 3.59 (1H, dd, J=4, 16Hz), 3.60 (1H, dd, J=4, 16Hz), 5.58-5.70 (2H, m), 7.01 (1H, d, J=16Hz), 7.48 (1H, d, J=16Hz), 7.68-7.98 (8H, m), 8.05 (1H, d, J=16Hz), 8.12 (1H, dd, J=2, 8Hz), 8.31 (2H, d, J=6Hz), 8.44 (1H, t-like), 8.85-8.93 (3H, m), 8.69 (1H, br peak)

(7) 8-[2,6-Dimethyl-3-[N-methyl-N-[4-(2-oxopyrrolidin-1-yl)cinnamoylglycyl]amino]benzyloxy]-2-methylquinoline

NMR (CDCl₃, δ) : 2.11-2.25 (2H, m), 2.38 (3H, s), 2.54 (3H, s), 2.63 (2H, t, J=7.5Hz), 2.74 (3H, s), 3.27 (3H, s), 3.63 (1H, dd, J=17, 4Hz), 3.82-3.94 (3H, m), 5.38 (2H, s), 6.42 (1H, d, J=15Hz), 6.67 (1H, br s), 7.08 (1H, d, J=8Hz), 7.18 (1H, d, J=8Hz), 7.23-7.32 (2H, m), 7.40-7.59 (5H, m), 7.67 (2H, d, J=8Hz), 8.04 (1H, d, J=8Hz)

its hydrochloride

NMR (CDCl₃-CD₃OD, δ) : 2.12-2.26 (2H, m), 2.32 (3H, s), 2.50 (3H, s), 2.65 (2H, t, J=7.5Hz), 3.19 (3H, br s), 3.30 (3H, s), 3.80-3.93 (4H, m), 5.42 (1H, br d, J=10Hz), 5.51 (1H, br d, J=10Hz), 6.50 (1H, d, J=15Hz), 7.20 (1H, d, J=8Hz), 7.26 (1H, d, J=8Hz), 7.45-7.53 (3H, m), 7.59-7.68 (3H, m), 7.77-7.94 (3H, m), 8.90 (1H, br d, J=8Hz)

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(8) 8-[3-[N-(4-Acetamido-3-methylcinnamoylglycyl)-N-methylamino]-2,6-dimethylbenzyloxy]-2-methylquinoline

NMR (CDCl₃, δ) : 2.22 (3H, br s), 2.29 (3H, s), 2.54 (3H, s), 2.74 (3H, s), 3.27 (3H, s), 3.63 (1H, dd, J=17, 5Hz), 3.89 (1H, dd, J=17, 5Hz), 5.37 (2H, s), 6.41 (1H, d, J=15Hz), 6.67 (1H, br s), 7.02 (1H, br s), 7.09 (1H, d, J=8Hz), 7.19 (1H, d, J=8Hz), 7.23-7.55 (7H, m), 7.93 (1H, br d, J=8Hz), 8.05 (1H, d, J=8Hz)

its hydrochloride

NMR (CDCl₃-CD₃OD, δ) : 2.24-2.38 (9H, overlapped with H₂O), 2.50 (3H, s), 3.13 (3H, br s), 3.28 (3H, s), 3.78 (1H, br d, J=17Hz), 3.87 (1H, br d, J=17Hz), 5.41 (1H, d, J=10Hz), 5.50 (1H, d, J=10Hz), 6.45 (1H, d, J=15Hz), 7.19-7.30 (4H, m), 7.39 (1H, d, J=15Hz), 7.64 (1H, d, J=8Hz), 7.70 (1H, d, J=8Hz), 7.76-7.93 (3H, m), 7.93 (1H, br d, J=8Hz), 8.05 (1H, d, J=8Hz)

(9) 8-[3-[N-(4-Acetamido-3-methoxycinnamoylglycyl)-N-methylamino]-2,6-dimethylbenzyloxy]-2-methylquinoline

NMR (CDCl₃, δ) : 2.21 (3H, s), 2.38 (3H, s), 2.53 (3H, s), 2.72 (3H, s), 3.25 (3H, s), 3.62 (1H, dd, J=17, 5Hz), 3.82-3.93 (4H, m), 5.37 (2H, s), 6.40 (1H, d, J=15Hz), 6.65 (1H, br s), 6.98 (1H, br s), 7.04-7.20 (3H, m), 7.22-7.32 (2H, m), 7.40-7.54 (3H, m), 7.81 (1H, br s), 8.02 (1H, d, J=8Hz), 8.38 (1H, br d, J=8Hz)

its hydrochloride

NMR (CDCl₃-CD₃OD, δ) : 2.21 (3H, s), 2.26-2.45 (3H, overlapped with H₂O), 2.50 (3H, s), 3.18 (3H, br s), 3.29 (3H, s), 3.82 (2H, br s), 3.95 (3H, s), 5.38-5.55 (2H, m), 6.49 (1H, br d, J=15Hz), 7.00-

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7.10 (2H, m), 7.20-7.32 (2H, m), 7.46 (1H, br d, J=15Hz), 7.64 (1H, br s), 7.75-7.97 (3H, m), 8.29 (1H, d, J=8Hz), 8.90 (1H, br s)

- 5 (10) 8-[3-[N-(4-Acetamido-3-methoxycinnamoylglycyl)-N-methylamino]-2,6-dimethylbenzyloxy]-2,4-dimethylquinoline

10 NMR (CDCl₃, δ) : 2.20 (3H, s), 2.35 (3H, s), 2.50 (3H, s), 2.64 (3H, s), 2.66 (3H, s), 3.24 (3H, s), 3.60 (1H, dd, J=17, 5Hz), 3.82-3.92 (4H, m), 5.33 (2H, s), 6.39 (1H, d, J=15Hz), 6.64 (1H, br t, J=5Hz), 6.98 (1H, br s), 7.03-7.26 (5H, m), 7.40-7.52 (2H, m), 7.61 (1H, d, J=8Hz), 7.80 (1H, br s), 8.36 (1H, d, J=8Hz)

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its hydrochloride

20 NMR (CDCl₃-CD₃OD, δ) : 2.21 (3H, s), 2.33 (3H, s), 2.49 (3H, s), 2.95 (3H, s), 3.12 (3H, s), 3.29 (3H, s), 3.82 (2H, br s), 3.93 (3H, s), 5.42 (1H, d, J=10Hz), 5.50 (1H, d, J=10Hz), 6.50 (1H, d, J=15Hz), 7.01-7.08 (2H, m), 7.20 (1H, d, J=8Hz), 7.26 (1H, d, J=8Hz), 7.45 (1H, d, J=15Hz), 7.61 (1H, br d, J=8Hz), 7.70 (1H, br s), 7.78-7.92 (2H, m), 8.28 (1H, d, J=8Hz)

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- (11) 2,4-Dimethyl-8-[2,6-dimethyl-3-[N-(4-(dimethylcarbamoyl)cinnamoylglycyl)-N-methylamino]benzyloxy]quinoline

30 NMR (CDCl₃, δ) : 2.37 (3H, s), 2.52 (3H, s), 2.65 (3H, s), 2.67 (3H, s), 2.99 (3H, br s), 3.11 (3H, br s), 3.26 (3H, s), 3.63 (1H, dd, J=17, 5Hz), 3.89 (1H, dd, J=17, 5Hz), 5.33 (2H, s), 6.50 (1H, d, J=15Hz), 6.71 (1H, br s), 7.07 (1H, d, J=8Hz), 7.11-7.28 (3H, m), 7.37-7.64 (7H, m)

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its hydrochloride

5 NMR (CDCl₃-CD₃OD, δ) : 2.24 (3H, s), 2.50 (3H, s),
2.94 (3H, s), 3.06 (6H, br s), 3.14 (3H, s), 3.30
(3H, s), 3.84 (2H, br s), 5.42 (1H, d, J=10Hz),
5.50 (1H, d, J=10Hz), 6.61 (1H, d, J=15Hz), 7.21
(1H, d, J=8Hz), 7.26 (1H, d, J=8Hz), 7.40 (2H, br
d, J=8Hz), 7.49-7.58 (3H, m), 7.61 (1H, br d,
J=8Hz), 7.70 (1H, br s), 7.78-7.90 (2H, m)

10 (12) 2,4-Dimethyl-8-[2,6-dimethyl-3-[N-methyl-N-[4-(2-
oxopyrrolidin-1-yl)cinnamoylglycyl]amino]benzyloxy]-
quinoline

15 NMR (CDCl₃, δ) : 2.11-2.23 (2H, m), 2.37 (3H, s), 2.53
(3H, s), 2.59-2.70 (8H, m), 3.26 (3H, s), 3.61 (1H,
dd, J=17, 4Hz), 3.83-3.93 (3H, m), 5.35 (2H, s),
6.42 (1H, d, J=15Hz), 6.65 (1H, br s), 7.07 (1H, d,
J=8Hz), 7.14-7.19 (2H, m), 7.22-7.28 (1H,
overlapped with CDCl₃), 7.41-7.57 (4H, m), 7.60-
7.67 (3H, m)

its hydrochloride

20 NMR (CDCl₃-CD₃OD, δ) : 2.13-2.26 (2H, m), 2.32 (3H,
s), 2.49 (3H, s), 2.63 (2H, d, J=7.5Hz), 2.95 (3H,
s), 3.11 (3H, s), 3.29 (3H, s), 3.81 (2H, s), 3.89
25 (2H, d, J=7.5Hz), 5.42 (1H, d, J=10Hz), 5.50 (1H,
d, J=10Hz), 6.50 (1H, d, J=15Hz), 7.20 (1H, br d,
J=8Hz), 7.26 (1H, br d, J=8Hz), 7.44-7.52 (3H, m),
7.59-7.66 (3H, m), 7.70 (1H, br s), 7.79-7.90 (2H,
m)

30 (13) 2,4-Dimethyl-8-[2,6-dimethyl-3-[N-methyl-N-[4-
(propionamido)cinnamoylglycyl]amino]benzyloxy]quinoline

35 NMR (CDCl₃, δ) : 1.22 (3H, t, J=7.5Hz), 2.31-2.42 (5H,
m), 2.51 (3H, s), 2.66 (6H, s), 3.24 (3H, s), 3.61
(1H, dd, J=17, 5Hz), 3.86 (1H, dd, J=17, 5Hz), 5.32

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(2H, s), 6.39 (1H, d, J=15Hz), 6.64 (1H, br t, J=5Hz), 7.05 (1H, d, J=8Hz), 7.14 (2H, d, J=8Hz), 7.25 (1H, d, J=8Hz), 7.40-7.56 (7H, m), 7.62 (1H, d, J=8Hz)

5

its hydrochloride

NMR (CDCl₃-CD₃OD, δ) : 1.20 (3H, t, J=7.5Hz), 2.31 (3H, s), 2.40-2.50 (5H, m), 2.93 (3H, s), 3.05 (3H, br s), 3.27 (3H, s), 3.85 (2H, br s), 5.40 (1H, br d, J=10Hz), 5.48 (1H, br d, J=10Hz), 6.42 (1H, br d, J=15Hz), 7.18-7.39 (3H, m), 7.58-7.65 (3H, m), 7.69 (1H, br s), 7.76-7.89 (2H, m)

10

(14) 2,4-Dimethyl-8-[2,6-dimethyl-3-[N-methyl-N-[4-(methyl-carbamoyl)cinnamoylglycyl]amino]benzyloxy]quinoline

15

NMR (CDCl₃, δ) : 2.36 (3H, s), 2.52 (3H, s), 2.65 (6H, s), 3.01 (3H, d, J=5Hz), 3.26 (3H, s), 3.63 (1H, dd, J=4, 17Hz), 3.88 (1H, dd, J=4, 17Hz), 5.35 (2H, s), 6.21 (1H, q-like), 6.53 (1H, d, J=16Hz), 6.72 (1H, t-like), 7.07 (1H, d, J=8Hz), 7.12-7.19 (2H, m), 7.22-7.29 (1H, m), 7.46 (1H, t, J=8Hz), 7.50-7.65 (4H, m), 7.75 (2H, d, J=8Hz)

20

its hydrochloride

25

NMR (DMSO-d₆, δ) : 2.27 (3H, s), 2.47 (3H, s), 2.79 (3H, d, J=4Hz), 2.90 (6H, s), 3.12 (3H, s), 3.57 (1H, dd, J=4, 16Hz), 3.63-3.85 (1H, m), 5.41-5.55 (2H, m), 6.90 (1H, d, J=16Hz), 7.28-7.44 (3H, m), 7.63 (2H, d, J=8Hz), 7.82-8.00 (6H, m), 8.28 (1H, t-like), 8.50 (1H, q-like)

30

(15) 8-[3-[N-(4-Acetamido-3-methylcinnamoylglycyl)-N-methylamino]-2,6-dimethylbenzyloxy]-2,4-dimethylquinoline

35

NMR (CDCl₃, δ) : 2.22 (3H, s), 2.26 (3H, s), 2.35 (3H,

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5 s), 2.52 (3H, s), 2.65 (3H, s), 2.67 (3H, s), 3.25 (3H, s), 3.61 (1H, dd, J=4, 18Hz), 3.87 (1H, dd, J=4, 18Hz), 5.35 (2H, s), 6.40 (1H, d, J=16Hz), 6.64 (1H, brpeak), 6.99 (1H, brpeak), 7.06 (1H, d, J=8Hz), 7.11-7.19 (2H, m), 7.22-7.28 (1H, m), 7.28-7.40 (2H, m), 7.40-7.54 (2H, m), 7.62 (1H, d, J=8Hz), 7.93 (1H, br d, J=8Hz)

its hydrochloride

10 NMR (DMSO-d₆, δ) : 2.07 (3H, s), 2.21 (3H, s), 2.29 (3H, s), 2.46 (3H, s), 2.90 (6H, s), 3.11 (3H, s), 3.54 (1H, dd, J=4, 18Hz), 3.70 (1H, dd, J=4, 18Hz), 5.43-5.55 (2H, m), 6.73 (1H, d, J=16Hz), 7.22-7.42 (5H, m), 7.54 (1H, d, J=8Hz), 7.86-8.00 (4H, m),
15 8.18 (1H, t, J=6Hz), 9.36 (1H, s)

(16) 8-[3-[N-[(E)-3-(1-Acetyl-1,2,3,4-tetrahydroquinolin-6-yl)acryloyl]glycyl]-N-methylamino]-2,6-dimethylbenzyloxy]-2,4-dimethylquinoline

20 NMR (CDCl₃, δ) : 1.96 (2H, quint, J=7Hz), 2.25 (3H, s), 2.36 (3H, s), 2.53 (3H, s), 2.65 (3H, s), 2.68 (3H, s), 2.74 (2H, t, J=7Hz), 3.25 (3H, s), 3.61 (1H, dd, J=4, 18Hz), 3.77 (2H, t, J=7Hz), 3.88 (1H, dd, J=4, 18Hz), 5.34 (2H, s), 6.42 (1H, d, J=16Hz),
25 6.65 (1H, t-like), 7.07 (1H, d, J=8Hz), 7.13-7.20 (2H, m), 7.21-7.35 (4H, m), 7.41-7.56 (2H, m), 7.63 (1H, d, J=8Hz)

its hydrochloride

30 NMR (DMSO-d₆, δ) : 1.84 (2H, quint), 2.16 (3H, s), 2.25 (3H, s), 2.45 (3H, s), 2.70 (2H, t, J=7Hz), 2.87 (6H, s), 3.53 (1H, dd, J=4, 16Hz), 3.61-3.73 (3H, m), 5.41-5.53 (2H, m), 6.73 (1H, d, J=16Hz), 7.23-7.38 (5H, m), 7.46-7.59 (1H, brpeak), 7.84-
35 7.98 (4H, m), 8.16 (1H, t, J=6Hz)

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(17) 2,4-Dimethyl-8-[2,6-dimethyl-3-[N-[4-(ethylcarbamoyl)-
cinnamoylglycyl]-N-methylamino]benzyloxy]quinoline

NMR (CDCl₃, δ) : 1.25 (3H, t, J=7.5Hz), 2.36 (3H, s),
2.52 (3H, s), 2.65 (3H, s), 2.66 (3H, s), 3.26 (3H,
s), 3.50 (2H, quint, J=7.5Hz), 3.62 (1H, dd, J=4,
18Hz), 3.87 (1H, dd, J=4, 18Hz), 5.34 (2H, s), 6.09
(1H, t-like), 6.53 (1H, d, J=16Hz), 6.71 (1H,
t-like), 7.06 (1H, d, J=8Hz), 7.11-7.18 (2H, m),
7.22-7.27 (1H, m), 7.45 (1H, t, J=8Hz), 7.50-7.64
(4H, m), 7.74 (2H, d, J=8Hz)

its hydrochloride

NMR (DMSO-d₆, δ) : 1.11 (3H, t, J=7.5Hz), 2.28 (3H,
s), 2.46 (3H, s), 2.88 (6H, s), 3.12 (3H, s), 3.28
(2H, quint, J=7.5Hz), 3.56 (1H, dd, J=4, 18Hz),
3.73 (1H, dd, J=4, 18Hz), 5.43-5.55 (2H, m), 6.90
(1H, d, J=16Hz), 7.31 (1H, d, J=8Hz), 7.35-7.44
(2H, m), 7.63 (2H, d, J=8Hz), 7.82-8.00 (6H, m),
8.28 (1H, t-like), 8.52 (1H, t-like)

(18) 2,4-Dimethyl-8-[2,6-dimethyl-3-[N-methyl-N-[4-(iso-
nicotinamido)cinnamoylglycyl]amino]benzyloxy]quinoline

NMR (CDCl₃, δ) : 2.26 (3H, s), 2.42 (3H, s), 2.59 (3H,
s), 2.66 (3H, s), 3.19 (3H, s), 3.59 (1H, dd, J=4,
18Hz), 3.80 (1H, dd, J=4, 18Hz), 5.30 (2H, s), 6.40
(1H, d, J=16Hz), 7.00 (1H, d, J=8Hz), 7.07 (1H, d,
J=8Hz), 7.14 (1H, s), 7.26 (1H, d, J=8Hz), 7.40-
7.53 (4H, m), 7.59-7.60 (3H, m), 7.75 (2H, d,
J=5Hz), 8.67-8.75 (3H, m)

its dihydrochloride

NMR (DMSO-d₆, δ) : 2.28 (3H, s), 2.45 (3H, s), 2.88
(6H, s), 3.11 (3H, s), 3.55 (1H, dd, J=4, 16Hz),
5.42-5.55 (2H, m), 6.75 (1H, d, J=16Hz), 7.28-7.43
(3H, m), 7.59 (2H, d, J=8Hz), 7.81-7.99 (6H, m),

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7.99-8.06 (2H, m), 8.21 (1H, t-like), 8.87 (2H, d, J=5Hz), 10.82 (1H, s)

5 (19) 2,4-Dimethyl-8-[2,6-dimethyl-3-[N-[(E)-3-(6-ethoxycarbonylpyridin-3-yl)acryloylglycyl]-N-methylamino]benzyloxy]quinoline

10 NMR (CDCl₃, δ) : 1.46 (3H, t, J=7.5Hz), 2.37 (3H, s), 2.53 (3H, s), 2.65 (3H, s), 2.68 (3H, s), 3.27 (3H, s), 3.62 (1H, dd, J=17, 5Hz), 3.90 (1H, dd, J=17, 5Hz), 4.49 (2H, q, J=7.5Hz), 5.35 (2H, s), 6.62 (1H, d, J=15Hz), 6.79 (1H, br t, J=5Hz), 7.07 (1H, d, J=8Hz), 7.13-7.20 (2H, m), 7.22-7.28 (2H, m), 7.44 (1H, t, J=8Hz), 7.54-7.66 (3H, m), 7.91 (1H, dd, J=8, 3Hz), 8.12 (1H, d, J=8Hz), 8.84 (1H, br s)

15 (20) 8-[3-[N-[(E)-3-(6-Acetamidopyridin-3-yl)acryloylglycyl]-N-methylamino]-2,6-dimethylbenzyloxy]-2,4-dimethylquinoline

20 NMR (CDCl₃, δ) : 2.20 (3H, s), 2.36 (3H, s), 2.52 (3H, s), 2.66 (3H, s), 2.69 (3H, s), 3.25 (3H, s), 3.63 (1H, dd, J=4, 18Hz), 3.88 (1H, dd, J=4, 18Hz), 5.33 (2H, s), 6.45 (1H, d, J=16Hz), 6.72 (1H, t-like), 7.07 (1H, d, J=8Hz), 7.12-7.19 (2H, m), 7.22-7.26 (1H, m), 7.40-7.56 (2H, m), 7.62 (1H, d, J=8Hz), 7.81 (1H, dd, J=2, 8Hz), 8.07 (1H, s), 8.20 (1H, d, J=8Hz), 8.34 (1H, d, J=2Hz)

its dihydrochloride

30 NMR (DMSO-d₆, δ) : 2.11 (3H, s), 2.28 (3H, s), 2.46 (3H, s), 2.89 (6H, s), 3.11 (3H, s), 3.54 (1H, dd, J=4, 16Hz), 3.71 (1H, dd, J=4, 16Hz), 5.42-5.55 (2H, m), 6.81 (1H, d, J=16Hz), 7.29-7.42 (3H, m), 7.86-8.04 (5H, m), 8.11 (1H, d, J=8Hz), 8.23 (1H, t-like), 8.48 (1H, d-like)

35

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(21) 8-[3-[N-[(E)-3-(6-Aminopyridin-3-yl)acryloylglycyl]-N-methylamino]-2,6-dimethylbenzyloxy]-2,4-dimethylquinoline

NMR (CDCl₃, δ) : 2.33 (3H, s), 2.52 (3H, s), 2.65 (3H, s), 2.67 (3H, s), 3.25 (3H, s), 3.61 (1H, dd, J=4, 18Hz), 3.86 (1H, dd, J=4, 18Hz), 4.66 (2H, br s), 5.33 (2H, s), 6.29 (1H, d, J=16Hz), 6.48 (1H, d, J=8Hz), 6.59 (1H, t-like), 7.05 (1H, d, J=8Hz), 7.10-7.19 (2H, m), 7.21-7.28 (1H, m), 7.40-7.50 (2H, m), 7.56-7.65 (2H, m), 8.17 (1H, d, J=2Hz)

(22) 2,4-Dimethyl-8-[2,6-dimethyl-3-[N-methyl-N-[(E)-3-[6-[(E)-2-(4-pyridyl)vinyl]pyridin-3-yl]acryloylglycyl]-amino]benzyloxy]quinoline

NMR (CDCl₃, δ) : 2.36 (3H, s), 2.53 (3H, s), 2.65 (3H, s), 2.68 (3H, s), 3.25 (3H, s), 3.64 (1H, dd, J=4, 18Hz), 3.90 (1H, dd, J=4, 18Hz), 5.35 (2H, s), 6.56 (1H, d, J=16Hz), 6.73 (1H, t-like), 7.07 (1H, d, J=8Hz), 7.12-7.20 (2H, m), 7.20-7.32 (1H, m), 7.32-7.50 (6H, m), 7.53-7.65 (2H, m), 7.82 (1H, dd, J=2, 8Hz), 8.61 (1H, d, J=6Hz), 8.73 (1H, d, J=2Hz)

its trihydrochloride

NMR (DMSO-d₆, δ) : 2.27 (3H, s), 2.45 (3H, s), 2.89 (6H, s), 3.11 (3H, s), 3.56 (1H, dd, J=4, 16Hz), 3.75 (1H, dd, J=4, 16Hz), 5.44-5.55 (2H, m), 7.02 (1H, d, J=16Hz), 7.29-7.41 (2H, m), 7.45 (1H, d, J=16Hz), 7.75 (1H, d, J=8Hz), 7.86-8.14 (8H, m), 8.25-8.40 (3H, m), 8.85-8.93 (3H, m)

(23) 2,4-Dimethyl-8-[2,6-dimethyl-3-[N-methyl-N-[(E)-3-[6-[(E)-2-(2-pyridyl)vinyl]pyridin-3-yl]acryloylglycyl]-amino]benzyloxy]quinoline

NMR (CDCl₃, δ) : 2.37 (3H, s), 2.53 (3H, s), 2.65 (3H, s), 2.66 (3H, s), 3.27 (3H, s), 3.64 (1H, dd, J=4,

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18Hz), 3.89 (1H, dd, J=4, 18Hz), 5.35 (2H, s),
 6.55 (1H, d, J=16Hz), 6.75 (1H, t-like), 7.08 (1H,
 d, J=8Hz), 7.13-7.28 (4H, m), 7.37-7.75 (8H, m),
 7.80 (1H, dd, J=2, 8Hz), 8.65 (1H, d, J=5Hz), 8.73
 (1H, d, J=2Hz)

its trihydrochloride

NMR (DMSO-d₆, δ) : 2.28 (3H, s), 2.46 (3H, s), 2.91
 (6H, s), 3.12 (3H, s), 3.57 (1H, dd, J=4, 16Hz),
 3.75 (1H, dd, J=4, 16Hz), 5.44-5.55 (2H, m), 7.02
 (1H, d, J=16Hz), 7.31 (1H, d, J=8Hz), 7.39 (1H, d,
 J=8Hz), 7.46 (1H, d, J=16Hz), 7.71 (1H, dd, J=5,
 8Hz), 7.79 (1H, d, J=8Hz), 7.89-8.06 (6H, m), 8.12-
 8.21 (2H, m), 8.26-8.40 (2H, m), 8.77 (1H, d,
 J=5Hz), 8.49 (1H, s-like)

(24) 2,4-Dimethyl-8-[2,6-dimethyl-3-[N-methyl-N-[(E)-3-[6-
 [(E)-2-(3-pyridyl)vinyl]pyridin-3-yl]acryloyl]glycyl]-
 amino]benzyloxy]quinoline

NMR (CDCl₃, δ) : 2.37 (3H, s), 2.54 (3H, s), 2.65 (3H,
 s), 2.68 (3H, s), 3.27 (3H, s), 3.64 (1H, dd, J=4,
 18Hz), 3.89 (1H, dd, J=4, 18Hz), 5.35 (2H, s), 6.55
 (1H, d, J=16Hz), 6.73 (1H, t-like), 7.06 (1H, d,
 J=8Hz), 7.12-7.27 (4H, m), 7.31 (1H, dd, J=5, 8Hz),
 7.39 (1H, t, J=8Hz), 7.45 (1H, d, J=8Hz), 7.52-7.71
 (3H, m), 7.80 (1H, dd, J=2, 8Hz), 7.89 (1H, ddd,
 J=2, 2, 8Hz), 8.53 (1H, d, J=5Hz), 8.70 (1H, d,
 J=2Hz), 8.80 (1H, d, J=2Hz)

its trihydrochloride

NMR (DMSO-d₆, δ) : 2.27 (3H, s), 2.46 (3H, s), 2.89
 (6H, s), 3.12 (3H, s), 3.55 (1H, dd, J=4, 16Hz),
 3.74 (1H, dd, J=4, 16Hz), 5.43-5.56 (2H, m), 6.99
 (1H, d, J=16Hz), 7.29-7.50 (3H, m), 7.64-7.76 (2H,
 m), 7.82-8.00 (6H, m), 8.09 (1H, d, J=8Hz), 8.32

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(1H, t-like), 8.20 (1H, dd, J=2, 8Hz), 8.76 (1H, d, J=5Hz), 8.83 (1H, s-like), 9.13 (1H, s-like)

5 (25) 2-Methyl-8-[2-methyl-3-[N-methyl-N-[4-(methylcarbamoyl)-cinnamoylglycyl]amino]benzyloxy]quinoline

NMR (CDCl₃, δ) : 2.32 (3H, s), 2.79 (3H, s), 3.02 (3H, d, J=5Hz), 3.28 (3H, s), 3.67 (1H, dd, J=17, 5Hz), 3.88 (1H, dd, J=17, 4Hz), 5.38 (1H, d, J=10Hz), 5.46 (1H, d, J=10Hz), 6.18 (1H, br d, J=5Hz), 6.52 (1H, d, J=15Hz), 6.70 (1H, br s), 7.06 (1H, dd, J=8, 3Hz), 7.12 (1H, br d, J=8Hz), 7.24-7.43 (4H, m), 7.50-7.66 (4H, m), 7.75 (2H, d, J=8Hz), 8.04 (1H, d, J=8Hz)

15 (26) 2,4-Dimethyl-8-[3-[N-methyl-N-[4-(methylcarbamoyl)-cinnamoylglycyl]amino]-2,4,6-trimethylbenzyloxy]-quinoline

mp : 213-215°C

20 NMR (CDCl₃, δ) : 2.20 (3H, s), 2.32 (3H, s), 2.48 (3H, s), 2.65 (3H, s), 2.67 (3H, s), 3.02 (3H, d, J=5Hz), 3.21 (3H, s), 3.57-3.78 (2H, m), 5.30 (2H, s), 6.22 (1H, br d, J=5Hz), 6.53 (1H, d, J=15Hz), 6.72 (2H, br t, J=5Hz), 7.05 (1H, s), 7.15 (1H, s), 7.21-7.28 (1H, overlapped with H₂O), 7.44 (1H, t, J=8Hz), 7.50-7.65 (4H, m), 7.75 (2H, d, J=8Hz)

25

its hydrochloride

30 NMR (CDCl₃-CD₃OD, δ) : 2.28 (3H, s), 2.30 (3H, br s), 2.43 (3H, s), 2.93 (3H, s), 2.99 (3H, s), 3.08 (3H, br s), 3.22 (3H, s), 3.70 (1H, br d, J=17Hz), 3.88 (1H, br d, J=17Hz), 5.38 (1H, br d, J=10Hz), 5.45 (1H, d, J=10Hz), 6.63 (1H, br d, J=15Hz), 7.11 (1H, s), 7.40-7.52 (3H, m), 7.60 (1H, br d, J=8Hz), 7.69-7.89 (5H, m)

35

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(27) 8-[2,6-Dimethoxy-3-[N-methyl-N-[4-(methylcarbamoyl)-
cinnamoylglycyl]amino]benzyloxy]-2-methylquinoline

NMR (CDCl₃, δ) : 2.26 (3H, s), 2.99 (3H, d, J=5Hz),
3.32 (3H, s), 3.82-3.92 (7H, m), 3.98 (1H, dd,
J=17, 5Hz), 5.31 (1H, d, J=10Hz), 5.47 (1H, d,
J=10Hz), 6.28 (1H, br d, J=5Hz), 6.51 (1H, d,
J=15Hz), 6.70 (1H, br t, J=5Hz), 6.75 (1H, d,
J=8Hz), 7.19 (1H, d, J=8Hz), 7.22-7.59 (7H, m),
7.74 (2H, d, J=8Hz), 7.99 (1H, d, J=8Hz)

its hydrochloride

NMR (CDCl₃-CD₃OD, δ) : 3.00 (3H, s), 3.12 (3H, s),
3.37 (3H, s), 3.79 (3H, s), 3.84 (3H, s), 3.96 (1H,
d, J=17Hz), 4.18 (1H, d, J=17Hz), 5.33 (1H, d,
J=10Hz), 5.54 (1H, d, J=10Hz), 6.63 (1H, d,
J=15Hz), 6.82 (1H, d, J=8Hz), 7.39 (2H, d, J=8Hz),
7.48-7.91 (8H, m), 8.83 (1H, d, J=8Hz)

(28) 2,4-Dimethyl-8-[2,6-dimethyl-3-[N-ethyl-N-[4-
(methylcarbamoyl)cinnamoylglycyl]amino]benzyloxy]-
quinoline

NMR (CDCl₃, δ) : 1.18 (3H, t, J=7.5Hz), 2.35 (3H, s),
2.54 (3H, s), 2.66 (6H, s), 3.01 (3H, d, J=5Hz),
3.29 (1H, m), 3.60 (1H, dd, J=17, 5Hz), 3.86 (1H,
dd, J=17, 5Hz), 4.19 (1H, m), 5.32 (1H, d, J=10Hz),
5.38 (1H, d, J=10Hz), 6.20 (1H, br d, J=5Hz), 6.52
(1H, d, J=15Hz), 6.76 (1H, br t, J=5Hz), 7.04 (1H,
d, J=8Hz), 7.13-7.20 (2H, m), 7.22-7.30 (1H,
overlapped with H₂O), 7.46 (1H, t, 8Hz), 7.50-7.65
(4H, m), 7.75 (2H, d, J=8Hz)

its hydrochloride

NMR (CDCl₃-CD₃OD, δ) : 1.18 (3H, t, J=7.5Hz), 2.32
(3H, s), 2.48 (3H, s), 2.95 (3H, s), 2.99 (3H, s),
3.07 (3H, s), 3.43 (1H, m), 3.80 (2H, br s), 4.09

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(1H, m), 5.40 (1H, d, J=10Hz), 5.50 (1H, d, J=10Hz), 6.60 (1H, d, J=15Hz), 7.17-7.28 (2H, m), 7.40-7.53 (3H, m), 7.62 (1H, d, J=8Hz), 7.71-7.90 (6H, m)

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(29) 2,4-Dimethyl-8-[2,6-dimethyl-3-[N-methyl-N-[3-[4-[(2-pyridylmethyl)carbamoyl]phenyl]propionylglycyl]amino]-benzyloxy]quinoline

NMR (CDCl₃, δ) : 2.32 (3H, s), 2.48-2.57 (5H, m), 2.65 (3H, s), 2.67 (3H, s), 2.99 (2H, t, J=7.5Hz), 3.45 (1H, dd, J=4, 18Hz), 3.72 (1H, dd, J=4, 18Hz), 4.75 (2H, d, J=5Hz), 5.33 (2H, s), 6.43 (1H, t-like), 7.02 (1H, d, J=8Hz), 7.11-7.34 (7H, m), 7.44 (1H, t, J=8Hz), 7.50 (1H, t-like), 7.59-7.71 (2H, m), 7.77 (2H, d, J=8Hz), 8.55 (1H, d, J=5Hz)

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its dihydrochloride

NMR (DMSO-d₆, δ) : 2.23 (3H, s), 2.38-2.52 (3H, m), 2.78-2.94 (8H, m), 3.09 (3H, s), 3.40 (1H, dd, J=4, 16Hz), 3.58 (1H, dd, J=4, 16Hz), 4.75 (2H, d, J=6Hz), 5.42-5.53 (2H, m), 7.26-7.37 (4H, m), 7.71-7.99 (8H, m), 8.06 (1H, t-like), 8.29-8.37 (1H, m), 8.76 (1H, d, J=5Hz), 9.35 (1H, t-like)

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(30) 8-[2,6-Dimethyl-3-[N-methyl-N-[4-(2-oxopyrrolidin-1-yl)cinnaomylglycyl]amino]benzyloxy]-2-methylquinoxaline

NMR (CDCl₃, δ) : 2.11-2.23 (2H, m), 2.34 (3H, s), 2.50 (3H, s), 2.62 (2H, t, J=7.5Hz), 2.77 (3H, s), 3.26 (3H, s), 3.64 (1H, dd, J=17, 5Hz), 3.81-3.91 (3H, m), 5.35 (2H, s), 6.42 (1H, d, J=15Hz), 6.64 (1H, br s), 7.10 (1H, d, J=8Hz), 7.19 (1H, d, J=8Hz), 7.30 (1H, d, J=8Hz), 7.48-7.57 (3H, m), 7.62-7.70 (3H, m), 7.75 (1H, d, J=8Hz), 8.74 (1H, s)

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(31) 8-[2,6-Dimethyl-3-[N-methyl-N-[4-(propionamido)-

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cinnamoylglycyl]amino]benzyloxy]-2-methylquinoxaline

NMR (CDCl₃, δ) : 1.24 (3H, t, J=7.5Hz), 2.34 (3H, s),
2.39 (2H, q, J=7.5Hz), 2.77 (3H, s), 3.27 (3H, s),
3.63 (1H, dd, J=17, 5Hz), 3.87 (1H, dd, J=17, 4Hz),
5.32 (2H, s), 6.40 (1H, d, J=15Hz), 6.63 (1H, br t,
J=5Hz), 7.09 (1H, d, J=8Hz), 7.18 (1H, d, J=8Hz),
7.29-7.33 (2H, m), 7.42-7.57 (5H, m), 7.68 (1H, t,
J=8Hz), 7.75 (1H, d, J=8Hz), 8.73 (1H, br s)

5
10 (32) 8-[2,6-Dimethyl-3-[N-[4-(dimethylcarbamoyl)-
cinnamoylglycyl]-N-methylamino]benzyloxy]-2-
methylquinoxaline

NMR (CDCl₃, δ) : 2.31 (3H, s), 2.50 (3H, s), 2.73 (3H,
s), 2.98 (3H, br s), 3.11 (3H, br s), 3.26 (3H, s),
15 3.63 (1H, dd, J=4, 18Hz), 3.87 (1H, dd, J=4, 18Hz),
5.34 (2H, s), 6.50 (1H, d, J=16Hz), 6.68 (1H, t-
like), 7.08 (1H, d, J=8Hz), 7.18 (1H, d, J=8Hz),
7.30 (1H, d, J=8Hz), 7.41 (2H, d, J=8Hz), 7.48-7.60
20 (3H, m), 7.65 (1H, t, J=8Hz), 7.75 (1H, d, J=8Hz),
8.73 (1H, s)

(33) 8-[2,6-Dimethyl-3-[N-[4-(ethylcarbamoyl)-
cinnamoylglycyl]-N-methylamino]benzyloxy]-2-
methylquinoxaline

25 NMR (CDCl₃, δ) : 1.25 (3H, t, J=7.5Hz), 2.34 (3H, s),
2.51 (3H, s), 2.76 (3H, s), 3.27 (3H, s), 3.45-3.56
(2H, m), 3.63 (1H, dd, J=17, 5Hz), 3.88 (1H, dd,
J=17, 4Hz), 5.35 (2H, s), 6.09 (1H, br t, J=7Hz),
6.52 (1H, d, J=15Hz), 6.71 (1H, br t, J=5Hz), 7.10
30 (1H, d, J=8Hz), 7.18 (1H, d, J=8Hz), 7.30 (1H, d,
J=8Hz), 7.51-7.61 (3H, m), 7.66 (1H, t, J=8Hz),
7.72-7.79 (3H, m), 8.74 (1H, br s)

35 (34) 8-[2,6-Dimethyl-3-[N-[(E)-3-(6-ethoxycarbonylpyridin-3-
yl)acryloylglycyl]-N-methylamino]benzyloxy]-2-

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methylquinoxaline

NMR (CDCl₃, δ) : 1.45 (3H, t, J=7.5Hz), 2.33 (3H, s),
2.51 (3H, s), 2.77 (3H, s), 3.27 (3H, s), 3.64 (1H,
dd, J=17, 5Hz), 3.89 (1H, dd, J=17, 4Hz), 4.49 (2H,
q, J=7.5Hz), 5.35 (2H, s), 6.63 (1H, d, J=15Hz),
6.78 (1H, br t, J=5Hz), 7.10 (1H, d, J=8Hz), 7.20
(1H, d, J=8Hz), 7.31 (1H, d, J=8Hz), 7.60 (1H, d,
J=15Hz), 7.67 (1H, t, J=8Hz), 7.76 (1H, d, J=8Hz),
7.92 (1H, dd, J=8, 3Hz), 8.14 (1H, d, J=8Hz), 8.74
(1H, br s), 8.85 (1H, d, J=3Hz)

(35) 8-[3-[N-[(E)-3-(6-Aminopyridin-3-yl)acryloylglycyl]-N-methylamino]-2,6-dimethylbenzyloxy]-2-methylquinoxaline

NMR (CDCl₃, δ) : 2.33 (3H, s), 2.50 (3H, s), 2.85 (3H,
s), 3.25 (3H, s), 3.63 (1H, dd, J=4, 18Hz), 3.85
(1H, dd, J=4, 18Hz), 4.69 (2H, s), 5.33 (2H, s),
6.30 (1H, d, J=16Hz), 6.49 (1H, d, J=8Hz), 6.61
(1H, t-like), 7.10 (1H, d, J=8Hz), 7.18 (1H, d,
J=8Hz), 7.31 (1H, d, J=8Hz), 7.47 (1H, d, J=16Hz),
7.57-7.71 (2H, m), 7.75 (1H, d, J=8Hz), 8.17 (1H,
s-like), 8.74 (1H, s-like)

Example 51

8-[3-[N-(4-Amino-3-methylcinnamoylglycyl)-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline was obtained from 8-[2,6-dichloro-3-[N-methyl-N-(3-methyl-4-nitrocinnamoylglycyl)amino]benzyloxy]-2-methylquinoline according to a similar manner to that of Preparation 15-(1).

NMR (CDCl₃, δ) : 2.16 (3H, s), 2.73 (3H, s), 3.26 (3H,
s), 3.61 (1H, dd, J=4, 16Hz), 3.82 (2H, br s), 3.93
(1H, dd, J=4, 16Hz), 5.60-5.70 (2H, m), 6.27 (1H,
d, J=16Hz), 6.48 (1H, t-like), 6.64 (1H, d, J=8Hz),
7.17-7.35 (5H, m), 7.35-7.51 (4H, m), 8.02 (1H, d,
J=8Hz)

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Example 52

To a solution of 8-[3-[N-(4-amino-3-methylcinnamoylglycyl)-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline (200 mg) and triethylamine (35.9 mg) in dichloromethane was dropwise added isobutyryl chloride (41.6 mg) at 0°C under nitrogen atmosphere, and the mixture was stirred for 30 minutes at the same temperature. The mixture was concentrated, and the residue was dissolved in methanol (3 ml). To the solution was added saturated sodium bicarbonate solution (1 ml), and the mixture was stirred for 2 hours at ambient temperature and concentrated. To the residue were added ethyl acetate and water, and the organic layer was washed with water, saturated sodium bicarbonate solution and brine, dried and concentrated. The residue was purified by preparative thin-layer chromatography (dichloromethane:methanol = 15:1, V/V) to give 8-[2,6-dichloro-3-[N-methyl-N-(4-isobutyramido-3-methylcinnamoylglycyl)amino]benzyloxy]-2-methylquinoline (195 mg) as an amorphous powder.

NMR (CDCl₃, δ) : 1.28 (6H, d, J=7.5Hz), 2.25 (3H, s), 2.56 (1H, m), 2.72 (3H, s), 3.26 (3H, s), 3.63 (1H, dd, J=4, 18Hz), 3.93 (1H, dd, J=4, 18Hz), 5.62 (1H, d, J=10Hz), 5.68 (1H, d, J=10Hz), 6.41 (1H, d, J=16Hz), 6.58 (1H, t-like), 7.02 (1H, br s), 7.23-7.55 (9H, m), 7.95-8.07 (2H, m)

its hydrochloride

NMR (DMSO-d₆, δ) : 1.10 (6H, d, J=7Hz), 2.21 (3H, s), 2.69 (1H, m), 2.89 (3H, s), 3.15 (3H, s), 3.58 (1H, dd, J=4, 16Hz), 3.88 (1H, dd, J=4, 16Hz), 5.57-5.69 (2H, m), 6.72 (1H, d, J=16Hz), 7.26-7.52 (4H, m), 7.77-7.99 (6H, m), 8.26 (1H, t, J=6Hz), 8.95 (1H, br s), 9.27 (1H, s)

Example 53

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The following compounds were obtained according to a similar manner to that of Example 52.

- 5 (1) 8-[2,6-Dichloro-3-[N-methyl-N-[3-methyl-4-(isonicotinamido)cinnamoylglycyl]amino]benzyloxy]-2-methylquinoline

10 NMR (CDCl₃, δ) : : 2.33 (3H, s), 2.72 (3H, s), 3.25 (3H, s), 3.63 (1H, dd, J=4, 18Hz), 3.93 (1H, dd, J=4, 18Hz), 5.58-5.68 (2H, m), 6.43 (1H, d, J=16Hz), 6.61 (1H, t-like), 7.21-7.33 (3H, m), 7.33-7.57 (6H, m), 7.70 (2H, d, J=6Hz), 7.77 (1H, s), 7.96-8.05 (2H, m), 8.80 (2H, d, J=6Hz)

its dihydrochloride

15 NMR (DMSO-d₆, δ) : 2.28 (3H, s), 2.93 (3H, s), 3.16 (3H, s), 3.60 (1H, dd, J=4, 16Hz), 3.90 (1H, dd, J=4, 16Hz), 5.59-5.70 (2H, m), 6.79 (1H, d, J=16Hz), 7.37 (1H, d, J=16Hz), 7.41-7.53 (3H, m), 7.79-7.99 (6H, m), 8.01 (2H, d, J=6Hz), 8.31 (1H, t, J=6Hz), 8.91 (2H, d, J=6Hz), 8.98 (1H, d, J=8Hz), 10.44 (1H, s)

- 25 (2) 2,4-Dimethyl-8-[2,6-dimethyl-3-[N-methyl-N-[(E)-3-(6-propionamidopyridin-3-yl)acryloylglycyl]amino]benzyloxy]quinoline

30 NMR (CDCl₃, δ) : 1.25 (3H, t, J=7.5Hz), 2.36 (3H, s), 2.44 (2H, q, J=7.5Hz), 2.65 (3H, s), 2.66 (3H, s), 3.25 (3H, s), 3.63 (1H, dd, J=4, 18Hz), 3.88 (1H, dd, J=4, 18Hz), 5.35 (2H, s), 6.55 (1H, d, J=16Hz), 6.70 (1H, t-like), 7.06 (1H, d, J=8Hz), 7.12-7.19 (2H, m), 7.21-7.28 (1H, m), 7.45 (1H, t, J=8Hz), 7.51 (1H, d, J=16Hz), 7.82 (1H, dd, J=2, 8Hz), 7.98 (1H, s), 8.22 (1H, d, J=8Hz), 8.44 (1H, d, J=2Hz)

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its dihydrochloride

NMR (DMSO-d₆, δ) : 1.07 (3H, t, J=7.5Hz), 2.26 (3H, s),
 2.42 (2H, q, J=7.5Hz), 2.46 (3H, s), 2.90 (6H, s),
 3.11 (3H, s), 3.54 (1H, dd, J=4, 16Hz), 3.71 (1H,
 5 dd, J=4, 16Hz), 5.54-5.55 (2H, m), 6.81 (1H, d,
 J=16Hz), 7.28-7.41 (3H, m), 7.89-8.06 (6H, m),
 8.13 (1H, d, J=8Hz), 8.23 (1H, t-like), 8.48 (1H,
 d, J=2Hz)

- 10 (3) 2,4-Dimethyl-8-[2,6-dimethyl-3-[N-methyl-N-[(E)-3-[6-(2-
 methylpyridine-3-carboxamido)pyridin-3-
 yl]acryloyl]glycyl]amino]benzyloxy]quinoline

NMR (CDCl₃, δ) : 2.37 (3H, s), 2.53 (3H, s), 2.65 (3H,
 15 s), 2.67 (3H, s), 2.75 (3H, s), 3.25 (3H, s), 3.63
 (1H, dd, J=4, 18Hz), 3.89 (1H, dd, J=4, 18Hz), 5.35
 (2H, s), 6.49 (1H, d, J=16Hz), 6.73 (1H, t-like),
 7.07 (1H, d, J=8Hz), 7.13-7.20 (2H, m), 7.20-7.27
 (2H, m), 7.45 (1H, t, J=8Hz), 7.52 (1H, d, J=16Hz),
 7.62 (1H, d, J=8Hz), 7.83 (1H, d, J=8Hz), 7.90 (1H,
 20 dd, J=2, 8Hz), 8.31-8.39 (2H, m), 8.40 (1H, s),
 8.63 (1H, d, J=6Hz)

its trihydrochloride

NMR (DMSO-d₆, δ) : 2.27 (3H, s), 2.47 (3H, s), 2.75
 25 (3H, s), 2.90 (6H, s), 3.12 (3H, s), 3.55 (1H, dd,
 J=4, 16Hz), 3.73 (1H, dd, J=4, 16Hz), 5.43-5.56
 (2H, m), 6.88 (1H, d, J=16Hz), 7.28-7.45 (3H, m),
 7.81 (1H, dd, J=6, 8Hz), 7.89-8.00 (4H, m), 8.10
 (1H, dd, J=2, 8Hz), 8.20-8.31 (2H, m), 8.46 (1H, d,
 30 J=8Hz), 8.56 (1H, d, J=2Hz), 8.80 (1H, d, J=6Hz),
 11.44 (1H, s)

- 35 (4) 2,4-Dimethyl-8-[2,6-dimethyl-3-[N-methyl-N-[(E)-3-[6-(4-
 pyridylacetamido)pyridin-3-yl]acryloyl]glycyl]amino]-
 benzyloxy]quinoline

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5 NMR (CDCl₃, δ) : 2.35 (3H, s), 2.51 (3H, s), 2.65 (3H, s), 2.67 (3H, s), 3.25 (3H, s), 3.62 (1H, dd, J=4, 18Hz), 3.74 (2H, s), 3.87 (1H, dd, J=4, 18Hz), 5.33 (2H, s), 6.45 (1H, d, J=16Hz), 6.74 (1H, t-like), 7.06 (1H, d, J=8Hz), 7.12-7.19 (2H, m), 7.22-7.30 (3H, m), 7.44 (1H, t, J=8Hz), 7.50 (1H, d, J=16Hz), 7.62 (1H, d, J=8Hz), 7.80-7.86 (1H, m), 8.08 (1H, s), 8.18 (1H, d, J=8Hz), 8.33 (1H, d, J=2Hz), 8.62 (2H, d, J=7Hz)

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its trihydrochloride

15 NMR (DMSO-d₆, δ) : 2.26 (3H, s), 2.45 (3H, s), 2.89 (6H, s), 3.11 (3H, s), 3.47-3.59 (1H, m), 3.66-3.77 (1H, m), 4.17 (2H, s), 5.42-5.55 (2H, m), 6.83 (1H, d, J=16Hz), 7.27-7.41 (3H, m), 7.85-8.10 (8H, m), 8.22 (1H, t-like), 8.51 (1H, s-like), 8.86 (2H, d, J=6Hz)

20 (5) 8-[2,6-Dimethyl-3-[N-methyl-N-[(E)-3-[6-(2-methylpyridine-3-carboxamido)pyridin-3-yl]acryloylglycyl]amino]benzyloxy]-2-methylquinoxaline

25 NMR (CDCl₃, δ) : 2.33 (3H, s), 2.50 (3H, s), 2.75 (6H, s), 3.25 (3H, s), 3.63 (1H, dd, J=4, 18Hz), 3.87 (1H, dd, J=4, 18Hz), 5.34 (2H, s), 6.48 (1H, d, J=16Hz), 6.72 (1H, t-like), 7.09 (1H, d, J=8Hz), 7.14-7.17 (2H, m), 7.31 (1H, d, J=8Hz), 7.54 (1H, d, J=16Hz), 7.67 (1H, t, J=8Hz), 7.75 (1H, d, J=8Hz), 7.83 (1H, d, J=8Hz), 7.92 (1H, dd, J=2, 8Hz), 8.32-8.44 (3H, m), 8.64 (1H, d, J=5Hz), 8.74 (1H, s)

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Example 54

To a solution of 8-[3-[N-(4-amino-3-methylcinnamoylglycyl)-N-methylamino]-2,6-dichlorobenzyloxy]-

35 2-methylquinoline (200 mg) and triethylamine (35.9 mg) in

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dichloromethane was dropwise added methanesulfonyl chloride (0.03 ml) at 0°C under nitrogen atmosphere, and the mixture was stirred for 1 hour at the same temperature.

Methanesulfonyl chloride (0.03 ml) and triethylamine (36 mg) were further added thereto, and the mixture was stirred for 1 hour at the same temperature. The solvent was removed in vacuo, and the residue was dissolved in methanol. To the solution was added 1N sodium hydroxide solution (0.5 ml), and the mixture was stirred for 3 hours at ambient temperature and concentrated. To the residue were added dichloromethane and water, the organic layer was washed with water, saturated sodium bicarbonate solution and brine, dried and concentrated in vacuo. The residue was purified by preparative thin-layer chromatography (dichloromethane:methanol = 15:1, V/V) to give 8-[2,6-dichloro-3-[N-(4-methanesulfonamido-3-methylcinnamoyl)glycyl]-N-methylamino]benzyloxy]-2-methylquinoline (185 mg) as an amorphous powder.

NMR (CDCl₃, δ) : 2.29 (3H, s), 2.73 (3H, s), 3.05 (3H, s), 3.26 (3H, s), 3.64 (1H, dd, J=4, 18Hz), 3.95 (1H, dd, J=4, 18Hz), 5.65 (2H, s-like), 6.27 (1H, s), 6.43 (1H, d, J=16Hz), 6.62 (1H, t-like), 7.22-7.57 (10H, m), 8.03 (1H, d, J=8Hz)

its hydrochloride

NMR (DMSO-d₆, δ) : 2.30 (3H, s), 2.88 (3H, s), 3.02 (3H, s), 3.58 (1H, dd, J=4, 16Hz), 5.56-5.69 (2H, m), 6.75 (1H, d, J=16Hz), 7.28-7.47 (4H, m), 7.75-7.97 (6H, m), 8.29 (1H, t, J=6Hz), 8.91 (1H, br s), 9.19 (1H, s)

Example 55

2,4-Dimethyl-8-[2,6-dimethyl-3-[N-[(E)-3-(6-methanesulfonamidopyridin-3-yl)acryloyl]glycyl]-N-methylamino]benzyloxy]quinoline was obtained according to a similar manner to that of Example 54.

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5 NMR (CDCl₃, δ) : 2.35 (3H, s), 2.51 (3H, s), 2.62 (3H, s), 2.64 (3H, s), 3.19 (3H, s), 3.25 (3H, s), 3.62 (1H, dd, J=4, 16Hz), 3.87 (1H, dd, J=4, 16Hz), 5.33 (2H, s), 6.41 (1H, d, J=16Hz), 6.73 (1H, t-like), 7.06 (1H, d, J=8Hz), 7.10-7.27 (5H, m), 7.38-7.50 (2H, m), 7.62 (1H, d, J=8Hz), 7.80 (1H, d, J=8Hz), 8.29 (1H, d, J=2Hz)

its dihydrochloride

10 NMR (DMSO-d₆, δ) : 2.27 (3H, s), 2.46 (3H, s), 2.89 (6H, s), 3.11 (3H, s), 3.29 (3H, s), 3.53 (1H, dd, J=4, 16Hz), 3.71 (1H, dd, J=4, 16Hz), 5.43-5.55 (2H, m), 6.75 (1H, d, J=16Hz), 7.02 (1H, d, J=8Hz), 7.27-7.40 (3H, m), 7.86-8.00 (5H, m), 8.23 (1H, t-like), 8.40 (1H, s-like)

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Example 56

To a solution of 8-[3-[N-(4-amino-3-methylcinnamoylglycyl)-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline (200 mg) and triethylamine (35.9 mg) in dichloromethane was dropwise added methyl isocyanate (0.023 ml) at 0°C under nitrogen atmosphere, and the mixture was stirred for 1 hour at the same temperature and for 2 hours at ambient temperature. Methyl isocyanate (0.03 ml) was further added thereto, and the mixture was stirred overnight at ambient temperature. The mixture was partitioned between dichloromethane and water, the organic layer was washed with water, saturated sodium bicarbonate solution and brine, dried and concentrated in vacuo. The residue was purified by preparative thin-layer chromatography (dichloromethane:methanol = 15:1, V/V) to give 8-[2,6-dichloro-3-[N-methyl-N-[3-methyl-4-(N'-methylureido)-cinnamoylglycyl]amino]benzyloxy]-2-methylquinoline (150 mg) as an amorphous powder.

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35 NMR (CDCl₃, δ) : 2.07 (3H, s), 2.69 (3H, s), 2.78 (3H,

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5 d, J=5Hz), 3.24 (3H, s), 3.63 (1H, dd, J=4, 18Hz),
3.90 (1H, dd, J=4, 18Hz), 5.31 (1H, q-like), 5.61
(2H, s-like), 6.38 (1H, d, J=16Hz), 6.50 (1H, s),
6.64 (1H, t-like), 7.21-7.35 (5H, m), 7.39-7.51
(4H, m), 7.69 (1H, d, J=8Hz), 8.05 (1H, d, J=8Hz)

its hydrochloride

10 NMR (DMSO-d₆, δ) : 2.20 (3H, s), 2.66 (3H, s), 2.92
(3H, s), 3.15 (3H, s), 3.58 (1H, dd, J=4, 16Hz),
3.88 (1H, dd, J=4, 16Hz), 5.57-5.69 (2H, m), 6.63
(1H, d, J=16Hz), 7.21-7.34 (3H, m), 7.78-8.00 (8H,
m), 8.19 (1H, t-like), 9.00 (1H, brpeak)

Example 57

15 2,4-Dimethyl-8-[2,6-dimethyl-3-[N-[(E)-3-[6-(N'-
ethylureido)pyridin-3-yl]acryloylglycyl]-N-methylamino]-
benzyloxy]quinoline was obtained according to a similar
manner to that of Example 56.

20 NMR (CDCl₃, δ) : 1.25 (3H, t, J=7.5Hz), 2.36 (3H, s),
2.52 (3H, s), 2.65 (3H, s), 2.66 (3H, s), 3.25 (3H,
s), 3.42 (2H, quint, J=7.5Hz), 3.64 (1H, dd, J=4,
18Hz), 3.88 (1H, dd, J=4, 18Hz), 5.35 (2H, s), 6.40
(1H, d, J=16Hz), 6.70-6.78 (2H, m), 7.07 (1H, d,
J=8Hz), 7.13-7.19 (2H, m), 7.22-7.27 (1H, m), 7.40-
25 7.52 (2H, m), 7.63 (1H, d, J=8Hz), 7.73 (1H, d,
J=8Hz), 7.86 (1H, s), 8.25 (1H, d, J=2Hz), 9.15
(1H, brpeak)

its dihydrochloride

30 NMR (DMSO-d₆, δ) : 1.09 (3H, t, J=7.5Hz), 2.27 (3H,
s), 2.45 (3H, s), 2.88 (1H, s, J=6Hz), 3.11 (3H,
s), 3.13-3.25 (2H, m), 3.54 (1H, dd, J=4, 17Hz),
3.71 (1H, dd, J=4, 17Hz), 5.42-5.56 (2H, m), 6.74
(1H, d, J=16Hz), 7.27-7.40 (3H, m), 7.46 (1H, d,
J=8Hz), 7.85-8.02 (6H, m), 8.20 (1H, t, J=6Hz),
35

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8.33 (1H, d, J=2Hz), 9.72 (1H, br s)

Example 58

5 (1) 8-[3-[N-[4-(4-Bromobutyramido)-3-methylcinnamoylglycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline was obtained from 8-[3-[N-(4-amino-3-methylcinnamoylglycyl)-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline and 4-bromobutyric acid according to a similar manner to that of Example 5.

10 NMR (CDCl₃, δ) : 2.14-2.30 (5H, m), 2.61 (2H, t, J=7Hz), 2.73 (3H, s), 3.26 (3H, s), 3.59-3.71 (3H, m), 3.94 (1H, dd, J=4, 18Hz), 5.60-5.70 (2H, m), 6.41 (1H, d, J=16Hz), 6.60 (1H, brpeak), 7.07 (1H, br s), 7.21-7.55 (9H, m), 7.95 (1H, d-like), 8.03
15 (1H, d, J=8Hz)

20 (2) To a solution of 8-[3-[N-[4-(4-bromobutyramido)-3-methylcinnamoylglycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline (110 mg) in N,N-dimethylformamide was added potassium carbonate (64 mg) and the mixture was stirred for 2 hours at 50°C. The mixture was poured into water and extracted with ethyl acetate. The organic layer was washed with water and brine, dried and concentrated in vacuo. The residue was purified by preparative thin-layer chromatography
25 (dichloromethane-methanol) to give 8-[2,6-dichloro-3-[N-methyl-N-[3-methyl-4-(2-oxopyrrolidin-1-yl)cinnamoylglycyl]-amino]benzyloxy]-2-methylquinoline (72 mg) as an amorphous powder.

30 NMR (CDCl₃, δ) : 2.15-2.29 (5H, m), 2.58 (2H, t, J=7.5Hz), 2.73 (3H, s), 3.26 (3H, s), 3.64 (1H, dd, J=4, 18Hz), 3.73 (2H, t, J=7.5Hz), 3.93 (1H, dd, J=4, 18Hz), 5.60-5.70 (2H, m), 6.43 (1H, d, J=16Hz), 6.63 (1H, brpeak), 7.21-7.58 (9H, m), 8.02
35 (1H, d, J=8Hz)

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its hydrochloride

NMR (DMSO-d₆, δ) : 2.05-2.18 (5H, m), 2.41 (2H, t, J=7.5Hz), 2.90 (3H, s), 3.15 (3H, s), 3.58 (1H, dd, J=4, 16Hz), 3.68 (2H, t, J=7.5Hz), 3.90 (1H, dd, J=4, 16Hz), 5.58-5.69 (2H, m), 6.79 (1H, d, J=16Hz), 7.26 (1H, d, J=8Hz), 7.35 (1H, d, J=16Hz), 7.39-7.50 (2H, m), 7.77-7.98 (6H, m), 8.30 (1H, t-like), 7.96 (1H, brpeak)

10 Example 59

The following compounds were obtained according to a similar manner to that of Example 58-(1) and (2).

- 15 (1) 2,4-Dimethyl-8-[2,6-dimethyl-3-[N-methyl-N-[(E)-3-[6-(2-oxopyrrolidin-1-yl)pyridin-3-yl]acryloylglycyl]amino]-benzyloxy]quinoline

20 NMR (CDCl₃, δ) : 2.15 (2H, quint, J=7.5Hz), 2.36 (3H, s), 2.53 (3H, s), 2.61-2.72 (8H, m), 3.25 (3H, s), 3.63 (1H, dd, J=4, 18Hz), 3.87 (1H, dd, J=4, 18Hz), 4.11 (1H, t, J=7.5Hz), 5.35 (2H, s), 6.46 (1H, d, J=16Hz), 6.69 (1H, t-like), 7.07 (1H, d, J=8Hz), 7.13-7.19 (2H, m), 7.23-7.28 (1H, m), 7.45 (1H, t, J=8Hz), 7.52 (1H, d, J=16Hz), 7.63 (1H, d, J=8Hz), 7.82 (1H, dd, J=2, 8Hz), 8.38-8.45 (2H, m)

25

its dihydrochloride

30 NMR (DMSO-d₆, δ) : 2.05 (2H, quint, J=7.5Hz), 2.28 (3H, s), 2.47 (3H, s), 2.59 (2H, t, J=7.5Hz), 2.90 (6H, s), 3.11 (3H, s), 3.54 (1H, dd, J=4, 16Hz), 3.72 (1H, dd, J=4, 16Hz), 4.00 (2H, t, J=7.5Hz), 5.43-5.56 (2H, m), 6.82 (1H, d, J=16Hz), 7.27-7.41 (3H, m), 7.86-8.05 (5H, m), 8.25 (1H, t-like), 8.34 (1H, d, J=8Hz), 8.53 (1H, d-like)

- 35 (2) 8-[2,6-Dimethyl-3-[N-methyl-N-[(E)-3-[6-(2-

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oxopyrrolidin-1-yl)pyridin-3-yl]acryloylglycyl]amino]-
benzyloxy]-2-methylquinoxaline

5 NMR (CDCl₃, δ) : 2.14 (2H, quint, J=7.5Hz), 2.34 (3H,
s), 2.51 (3H, s), 2.68 (2H, t, J=7.5Hz), 2.76 (3H,
s), 3.25 (3H, s), 3.63 (1H, dd, J=4, 18Hz), 3.87
(1H, dd, J=4, 18Hz), 4.11 (2H, t, J=7.5Hz), 5.34
(2H, s), 6.46 (1H, d, J=16Hz), 6.67 (1H, t-like),
7.10 (1H, d, J=8Hz), 7.19 (1H, d, J=8Hz), 7.30 (1H,
d, J=8Hz), 7.53 (1H, d, J=16Hz), 7.67 (1H, t,
10 J=8Hz), 7.75 (1H, d, J=8Hz), 7.84 (1H, dd-like,
J=8Hz), 8.41-8.46 (2H, m), 8.74 (1H, s)

Example 60

15 The following compounds were obtained according to a
similar manner to that of Example 3.

(1) 8-[3-[N-[(E)-3-(6-Carboxypyridin-3-yl)acryloylglycyl]-N-
methylamino]-2,6-dimethylbenzyloxy]-2,4-
dimethylquinoline

20 NMR (DMSO-d₆, δ) : 2.30 (3H, s), 2.42 (3H, s), 2.51
(3H, s), 2.59 (3H, s), 3.09 (3H, s), 3.49 (1H, dd,
J=17, 5Hz), 3.68 (1H, dd, J=17, 5Hz), 5.28 (2H, br
s), 7.00 (1H, d, J=15Hz), 7.20-7.31 (3H, m), 7.39
(1H, d, J=8Hz), 7.42-7.60 (3H, m), 7.61 (1H, d,
25 J=8Hz), 8.03 (1H, d, J=8Hz), 8.11 (1H, dd, J=8,
2Hz), 8.31 (1H, br t, J=8Hz), 8.85 (1H, br s)

(2) 8-[3-[N-[(E)-3-(6-Carboxypyridin-3-yl)acryloylglycyl]-N-
methylamino]-2,6-dimethylbenzyloxy]-2-methylquinoxaline

30 NMR (CDCl₃, δ) : 2.36 (3H, s), 2.51 (3H, s), 2.78 (3H,
s), 3.28 (3H, s), 3.66 (1H, dd, J=17, 5Hz), 3.90
(1H, dd, J=17, 5Hz), 5.35 (2H, s), 6.68 (1H, d,
J=15Hz), 6.83 (1H, br t, J=5Hz), 7.10 (1H, d,
J=8Hz), 7.20 (1H, d, J=8Hz), 7.31 (1H, d, J=8Hz),
35 7.58-7.70 (2H, m), 7.77 (1H, d, J=8Hz), 8.02 (1H,

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dd, J=8, 2Hz), 8.21 (1H, d, J=8Hz), 8.70 (1H, br d, J=2Hz), 8.75 (1H, s)

Example 61

5 The following compounds were obtained according to a similar manner to that of Example 7.

10 (1) 2,4-Dimethyl-8-[2,6-dimethyl-3-[N-methyl-N-[(E)-3-[6-(4-pyridylcarbamoyl)pyridin-3-yl]acryloyl]glycyl]amino]-benzyloxy]quinoline

15 NMR (CDCl₃, δ) : 2.39 (3H, s), 2.55 (3H, s), 2.66 (3H, s), 2.68 (3H, s), 3.28 (3H, s), 3.67 (1H, dd, J=17, 5Hz), 3.91 (1H, dd, J=17, 4Hz), 5.36 (2H, s), 6.67 (1H, d, J=15Hz), 6.82 (1H, br s), 7.08 (1H, br d, J=8Hz), 7.13-7.30 (4H, m), 7.45 (1H, t, J=8Hz), 7.60-7.68 (2H, m), 7.71 (2H, d, J=7Hz), 8.01 (1H, br d, J=8Hz), 8.29 (1H, d, J=8Hz), 8.58 (2H, d, J=7Hz), 8.70 (1H, br s)

20 its trihydrochloride

25 NMR (CDCl₃-CD₃OD, δ) : 2.36 (3H, s), 2.49 (3H, s), 2.97 (3H, s), 3.12 (3H, br s), 3.30 (3H, s), 3.84 (1H, br d, J=17Hz), 3.95 (1H, br d, J=17Hz), 5.39 (1H, br d, J=10Hz), 5.49 (1H, br d, J=10Hz), 6.91 (1H, br d, J=15Hz), 7.22-7.31 (2H, m), 7.52 (1H, br d, J=15Hz), 7.62 (1H, br d, J=8Hz), 7.74 (1H, br s), 7.80-7.90 (2H, m), 8.16 (1H, br s), 8.37 (1H, br s), 8.42-8.51 (2H, m), 8.61-8.70 (2H, m), 8.95 (1H, br s)

30

35 (2) 2,4-Dimethyl-8-[2,6-dimethyl-3-[N-methyl-N-[(E)-3-[6-[(2-pyridylmethyl)carbonyl]pyridin-3-yl]-acryloyl]glycyl]amino]benzyloxy]quinoline

NMR (CDCl₃, δ) : 2.38 (3H, s), 2.53 (3H, s), 2.65 (3H, s), 2.67 (3H, s), 3.27 (3H, s), 3.64 (1H, dd, J=17,

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5 Hz), 3.90 (1H, dd, J=17, 4Hz), 4.80 (2H, d, J=7Hz), 5.35 (2H, s), 6.61 (1H, d, J=15Hz), 6.78 (1H, br t, J=5Hz), 7.08 (1H, d, J=8Hz), 7.13-7.28 (4H, m), 7.34 (1H, br d, J=8Hz), 7.45 (1H, t, J=8Hz), 7.57-7.70 (3H, m), 7.94 (1H, dd, J=8, 2Hz), 8.20 (1H, d, J=8Hz), 8.60 (1H, br d, J=7Hz), 8.68 (1H, d, J=2Hz), 8.89 (1H, br t, J=7Hz)

its trihydrochloride

10 NMR (CDCl₃-CD₃OD, δ) : 2.32 (3H, s), 2.46 (3H, s),
2.97 (3H, s), 3.10 (3H, br s), 3.26 (3H, s), 3.84
(1H, d, J=17Hz), 3.92 (1H, d, J=17Hz), 5.16 (2H,
s), 5.39 (1H, br d, J=10Hz), 5.49 (1H, br d,
J=10Hz), 6.99 (1H, br d, J=15Hz), 7.19-7.28 (2H,
15 m), 7.50 (1H, br d, J=15Hz), 7.61 (1H, br d,
J=8Hz), 7.72-7.92 (4H, m), 8.15 (1H, br d, J=8Hz),
8.34-8.58 (3H, m), 8.78 (1H, br d, J=7Hz), 9.07
(1H, br s)

20 (3) 2,4-Dimethyl-8-[2,6-dimethyl-3-[N-methyl-N-[(E)-3-[6-(methylcarbamoyl)pyridin-3-yl]acryloylglycyl]amino]-benzyloxy]quinoline

25 NMR (CDCl₃, δ) : 2.37 (3H, s), 2.53 (3H, s), 2.65 (3H,
s), 2.68 (3H, s), 3.04 (3H, d, J=5Hz), 3.27 (3H,
s), 3.64 (1H, dd, J=17, 5Hz), 3.90 (1H, dd, J=17,
5Hz), 5.34 (2H, s), 6.61 (1H, d, J=15Hz), 6.79 (1H,
br t, J=5Hz), 7.08 (1H, d, J=8Hz), 7.15-7.20 (2H,
m), 7.25 (1H, d, J=8Hz), 7.45 (1H, t, J=8Hz), 7.56-
7.66 (2H, m), 7.90-8.00 (2H, m), 8.19 (1H, d,
30 J=8Hz), 8.61 (1H, d, J=2Hz)

its dihydrochloride

35 NMR (CDCl₃-CD₃OD, δ) : 2.31 (3H, s), 2.40 (3H, s),
2.97 (3H, s), 3.06 (3H, s), 3.11 (3H, br s), 3.28
(3H, s), 3.88 (1H, d, J=17Hz), 4.06 (1H, d,

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J=17Hz), 5.34 (1H, d, J=10Hz), 5.46 (1H, d, J=10Hz), 7.10 (1H, br d, J=15Hz), 7.19-7.32 (2H, m), 7.49 (1H, br d, J=15Hz), 7.60 (1H, br d, J=8Hz), 7.72-7.89 (3H, m), 8.74 (1H, br d, J=8Hz), 8.88 (1H, br d, J=8Hz), 9.42 (1H, br s)

(4) 8-[2,6-Dimethyl-3-[N-methyl-N-[(E)-3-[6-(methylcarbamoyl)pyridin-3-yl]acryloylglycyl]amino]-benzyloxy]-2-methylquinoxaline

NMR (CDCl₃, δ) : 2.34 (3H, s), 2.52 (3H, s), 2.77 (3H, s), 3.04 (3H, d, J=5Hz), 3.28 (3H, s), 3.64 (1H, dd, J=17, 5Hz), 3.89 (1H, dd, J=17, 5Hz), 5.34 (2H, s), 6.61 (1H, d, J=15Hz), 6.76 (1H, br t, J=5Hz), 7.10 (1H, d, J=8Hz), 7.19 (1H, d, J=8Hz), 7.31 (1H, d, J=8Hz), 7.60 (1H, d, J=15Hz), 7.67 (1H, t, J=8Hz), 7.75 (1H, d, J=8Hz), 7.91-8.00 (2H, m), 8.20 (1H, d, J=8Hz), 8.61 (1H, d, J=2Hz), 8.73 (1H, s)

Example 62

(1) 4-Carboxy-8-[2,6-dimethyl-3-[N-[4-(methylcarbamoyl)-cinnamoylglycyl]-N-methylamino]benzyloxy]-2-methylquinoline was obtained from 8-[2,6-dimethyl-3-[N-[4-(methylcarbamoyl)-cinnamoylglycyl]-N-methylamino]benzyloxy]-4-ethoxycarbonyl-2-methylquinoline according to a similar manner to that of Example 3.

mp : 178.2-184.2°C

NMR (DMSO-d₆, δ) : 2.30 (3H, s), 2.45 (3H, s), 2.70 (3H, s), 2.76 (3H, d, J=5Hz), 3.10 (3H, s), 3.50 (1H, dd, J=17, 5Hz), 3.69 (1H, dd, J=17, 4Hz), 5.34 (2H, s), 6.87 (1H, d, J=15Hz), 7.27 (1H, d, J=8Hz), 7.34 (1H, d, J=8Hz), 7.40 (1H, d, J=15Hz), 7.53-7.71 (4H, m), 7.80-8.04 (3H, m), 8.18 (1H, d, J=8Hz), 8.27 (1H, br t, J=5Hz), 8.52 (1H, br q, J=5Hz)

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(2) 8-[2,6-Dimethyl-3-[N-[4-(methylcarbamoyl)-cinnamoylglycyl]-N-methylamino]benzyloxy]-2-methyl-4-(methylcarbamoyl)quinoline was obtained from 4-carboxy-8-[2,6-dimethyl-3-[N-[4-(methylcarbamoyl)cinnamoylglycyl]-N-methylamino]benzyloxy]-2-methylquinoline and methylamine hydrochloride according to a similar manner to that of Example 7.

NMR (CDCl₃, δ) : 2.36 (3H, s), 2.52 (3H, s), 2.64 (3H, s), 2.99 (3H, d, J=5Hz), 3.06 (3H, d, J=5Hz), 3.23 (3H, s), 3.47 (1H, dd, J=17, 5Hz), 3.79 (1H, dd, J=17, 4Hz), 5.36 (2H, s), 6.27 (1H, br q, J=5Hz), 6.50 (1H, d, J=15Hz), 6.58 (1H, br q, J=5Hz), 6.71-6.80 (1H, m), 7.04 (1H, d, J=9Hz), 7.15 (1H, d, J=9Hz), 7.21-7.30 (2H, m), 7.50-7.60 (3H, m), 7.51 (1H, d, J=15Hz), 7.67 (1H, d, J=9Hz), 7.75 (1H, d, J=8Hz)

its hydrochloride

NMR (CDCl₃-CD₃OD, δ) : 2.30 (3H, s), 2.50 (3H, s), 2.96 (3H, s), 3.06 (3H, s), 3.08 (3H, s), 3.28 (3H, s), 3.74 (1H, d, J=17Hz), 3.89 (1H, d, J=17Hz), 5.36 (1H, d, J=9Hz), 5.49 (1H, d, J=9Hz), 6.60 (1H, d, J=15Hz), 7.20-7.31 (2H, m), 7.49 (1H, d, J=15Hz), 7.55 (2H, d, J=9Hz), 7.65 (1H, d, J=8Hz), 7.78 (2H, d, J=9Hz), 7.85 (1H, t, J=8Hz), 8.00 (1H, s), 8.05 (1H, d, J=8Hz)

Example 63

A mixture of 3-[(Z)-2-(4-methylcarbamoylphenyl)vinyl]-benzoic acid (281 mg) and thionyl chloride (10 ml) was refluxed for 2 hours and then the mixture was concentrated in vacuo. The residue was dissolved in dichloromethane (10 ml), and triethylamine (0.3 ml) and 8-[2,6-dichloro-3-(methylamino)benzyloxy]-2-methylquinoline (347 mg) were added thereto with stirring under ice-bath cooling. The mixture

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was stirred for 12 hours at ambient temperature. Chloroform and brine were added thereto, and the organic layer was dried over magnesium sulfate and concentrated in vacuo. The residue was purified by flash chromatography (chloroform-methanol) to give 8-[2,6-dichloro-3-[N-methyl-N-[3-[(Z)-2-(4-methylcarbamoylphenyl)vinyl]benzoyl]amino]benzyloxy]-2-methylquinoline (110 mg) as an amorphous powder.

NMR (CDCl₃, δ) : 2.73 (3H, s), 3.02 (3H, d, J=6Hz), 3.40 (3H, s), 5.48 (1H, d, J=10Hz), 5.54 (1H, d, J=10Hz), 6.23 (1H, br s), 6.98-7.63 (14H), 7.70 (1H, d, J=8Hz), 8.02 (1H, d, J=8Hz)

Example 64

8-[2,6-Dichloro-3-[N-methyl-N-[3-[(E)-2-(4-methylcarbamoylphenyl)vinyl]benzoyl]amino]benzyloxy]-2-methylquinoline was obtained from 3-[(E)-2-(4-methylcarbamoylphenyl)vinyl]benzoic acid and 8-[2,6-dichloro-3-(methylamino)benzyloxy]-2-methylquinoline according to a similar manner to that of Example 63.

NMR (CDCl₃, δ) : 2.67 (2.4H, s), 2.69 (0.6H, s), 2.78 (3H, d, J=6Hz), 3.29 (2.4H, br s), 3.40 (0.6H, br s), 5.58 (2H, br s), 6.41 (0.4H, br s), 6.58 (1.6H, br s), 6.98-7.73 (15H), 8.03 (1H, d, J=8Hz)

Preparation 50

The mixture of 4-chloro-8-hydroxy-2-methylquinoline (600 mg), piperidine (6.13 ml) and tetrabutylammonium iodide (10 mg) was refluxed for 18 hours. The cooled reaction mixture was concentrated in vacuo and to the residue was added chloroform and aqueous sodium bicarbonate solution. The organic layer was dried over magnesium sulfate and evaporated in vacuo. The residue was recrystallized from n-hexane to give 8-hydroxy-2-methyl-4-piperidinoquinoline (712 mg) as pale brown crystals.

mp : 115-118°C

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NMR (CDCl₃, δ) : 1.63-1.74 (2H, m), 1.79-1.89 (4H, m),
2.64 (3H, s), 3.15-3.22 (4H, m), 6.70 (1H, s), 7.06
(1H, d, J=8Hz), 7.28 (1H, t, J=8Hz), 7.39 (1H, d,
J=8Hz)

5

Preparation 51

The following compounds were obtained according to a
similar manner to that of Preparation 6.

- 10 (1) 8-[2,6-Dichloro-3-[N-methyl-N-(phthalimidoacetyl)amino]-
benzyloxy]-4-dimethylamino-2-methylquinoline

NMR (CDCl₃, δ) : 2.66 (3H, s), 2.96 (3H, s), 3.21 (3H,
s), 4.07 (2H, s), 5.63 (1H, d, J=10Hz), 5.71 (1H,
d, J=10Hz), 6.99 (1H, s), 7.20 (1H, d, J=8Hz), 7.30
15 (1H, d, J=8Hz), 7.46 (1H, d, J=8Hz), 7.53 (1H, d,
J=8Hz), 7.65-7.75 (3H, m), 7.82-7.90 (2H, m)

- 20 (2) 8-[2,6-Dichloro-3-(N-phthalimidoacetyl-N-methylamino)-
benzyloxy]-2-methyl-4-piperidinoquinoline

mp : 223-226°C

NMR (CDCl₃, δ) : 1.59-1.72 (2H, m), 1.78-1.88 (4H, m),
2.65 (3H, s), 3.07-3.19 (4H, m), 3.22 (3H, s), 4.08
(2H, s), 5.64 (1H, d, J=10Hz), 5.71 (1H, d,
J=10Hz), 6.73 (1H, s), 7.20 (1H, br d, J=8Hz), 7.30
25 (1H, t, J=8Hz), 7.46 (1H, d, J=8Hz), 7.51 (1H, d,
J=8Hz), 7.64 (1H, br d, J=8Hz), 7.70-7.76 (2H, m),
7.82-7.89 (2H, m)

- 30 (3) 8-[2,6-Dichloro-3-(N-phthalimidoacetyl-N-
methylamino)benzyloxy]-2-methyl-4-morpholinoquinoline

NMR (CDCl₃, δ) : 2.69 (3H, s), 3.19 (4H, t, J=6Hz),
3.21 (3H, s), 3.96 (4H, t, J=5Hz), 4.06 (2H, s),
5.65 (1H, d, J=10Hz), 5.72 (1H, d, J=10Hz), 6.76
(1H, s), 7.22 (1H, d, J=8Hz), 7.32 (1H, t, J=8Hz),
35 7.47 (1H, d, J=8Hz), 7.53 (1H, d, J=8Hz), 7.66 (1H,

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d, J=8Hz), 7.72 (2H, dd, J=8, 2Hz), 7.84 (2H, dd, J=8, 2Hz)

Preparation 52

The following compounds were obtained according to a similar manner to that of Preparation 11.

(1) 8-[3-(N-Glycyl-N-methylamino)-2,6-dichlorobenzyloxy]-4-dimethylamino-2-methylquinoline

NMR (CDCl₃, δ) : 2.66 (3H, s), 2.91-3.13 (8H, m), 3.21 (3H, s), 5.61 (2H, s), 6.70 (1H, s), 7.12-7.36 (3H, m), 7.45 (1H, d, J=8Hz), 7.70 (1H, d, J=8Hz)

(2) 8-[3-(N-Glycyl-N-methylamino)-2,6-dichlorobenzyloxy]-2-methyl-4-piperidinoquinoline

NMR (CDCl₃, δ) : 1.57-1.90 (6H, m), 2.65 (3H, s), 2.97 (1H, d, J=17Hz), 3.02-3.18 (4H, m), 3.20 (3H, s), 5.60 (2H, s), 6.72 (1H, s), 7.15 (1H, br d, J=8Hz), 7.19-7.34 (2H, m), 7.43 (1H, d, J=8Hz), 7.64 (1H, br d, J=8Hz)

(3) 8-[3-(N-Glycyl-N-methylamino)-2,6-dichlorobenzyloxy]-2-methyl-4-morpholinoquinoline

NMR (CDCl₃, δ) : 2.69 (3H, s), 2.98 (1H, d, J=17Hz), 3.09 (1H, d, J=17Hz), 3.13-3.22 (4H), 3.20 (3H, s), 3.92-4.00 (4H), 5.62 (2H, s), 6.77 (1H, s), 7.16-7.26 (2H), 7.33 (1H, t, J=8Hz), 7.44 (1H, d, J=8Hz), 7.66 (1H, d, J=8Hz)

Preparation 53

The following compounds were obtained according to a similar manner to that of Preparation 2.

(1) Methyl 4-[N-(2-dimethylaminoethyl)carbamoyl]cinnamate

mp : 104-106°C

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NMR (CDCl₃, δ) : 2.27 (6H, s), 2.51 (2H, t, J=7Hz),
3.51 (2H, br q, J=7Hz), 3.81 (3H, s), 6.49 (1H, d,
J=15Hz), 6.85 (1H, br s), 7.58 (2H, br d, J=8Hz),
7.70 (1H, d, J=15Hz), 7.81 (2H, br d, J=8Hz)

5

(2) Methyl 4-[N-(2-dimethylaminoethyl)-N-methylcarbamoyl]-
cinnamate

NMR (CDCl₃, δ) : 2.09 (3H, br s), 2.31 (3H, br s),
2.36-2.64 (2H, m), 2.94-3.14 (3H, m), 3.32 (1H, br
s), 3.65 (1H, br s), 3.80 (3H, s), 6.47 (1H, d,
J=15Hz), 7.42 (2H, br d, J=8Hz), 7.55 (2H, br d,
J=8Hz), 7.69 (1H, d, J=15Hz)

10

Preparation 54

15

The following compounds were obtained according to a
similar manner to that of Preparation 3.

(1) 4-[N-(2-Dimethylaminoethyl)carbamoyl]cinnamic acid
mp : 219-223°C

20

NMR (DMSO-d₆, δ) : 2.33 (6H, s), 2.62 (2H, br t,
J=7Hz), 3.43 (2H, br q, J=7Hz), 6.59 (1H, d,
J=15Hz), 7.57 (1H, d, J=15Hz), 7.75 (2H, d, J=8Hz),
7.86 (2H, d, J=8Hz), 8.54 (1H, br t, J=7Hz)

25

(2) 4-[N-(2-Dimethylaminoethyl)-N-methylcarbamoyl]cinnamic
acid

mp : 171-174°C

NMR (DMSO-d₆, δ) : 1.98 (3H, br s), 2.28-2.60 (5H, m),
2.84-3.00 (4H, m), 3.07-3.75 (1H, overlapped with
H₂O), 6.59 (1H, d, J=15Hz), 7.40 (2H, d, J=8Hz),
7.61 (1H, d, J=15Hz), 7.74 (2H, d, J=8Hz)

30

Preparation 55

The following compounds were obtained according to a
similar manner to that of Preparation 46-(1).

35

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(1) N-(3-Aminobenzoyl)methanesulfonamide

(from N-(3-nitrobenzoyl)methanesulfonamide)

mp : 153-155°C

NMR (DMSO-d₆, δ) : 3.32 (3H, s), 6.78 (1H, dd, J=8,
2Hz), 7.01-7.17 (3H, m)

(2) N-(3-Aminobenzoyl)-4-methylbenzenesulfonamide

(from N-(3-nitrobenzoyl)-4-methylbenzenesulfonamide)

NMR (DMSO-d₆, δ) : 2.39 (3H, s), 6.74 (1H, br dd, J=8,
2Hz), 6.92-6.99 (2H, m), 7.08 (1H, t, J=8Hz), 7.41
(2H, d, J=8Hz), 7.84 (2H, d, J=8Hz)Preparation 56

To a solution of N-(3-aminobenzoyl)methanesulfonamide
(400 mg) in dioxane (4 ml) and 1N sodium hydroxide solution
(3.73 ml) was added phenyl chloroformate (351 mg) under ice-
cooling, and the mixture was stirred for 2.5 hours at ambient
temperature. Water was added thereto, the mixture was
adjusted pH 3 with hydrochloric acid. The mixture was
extracted with chloroform-methanol, and the extract was
dried over magnesium sulfate and concentrated in vacuo to
give phenyl 3-(methanesulfonylaminocarbonyl)phenylcarbamate
(600 mg) as colorless crystals.

mp : 201-202°C

NMR (DMSO-d₆, δ) : 3.22 (3H, s), 7.22-7.30 (3H, m),
7.47-7.57 (3H, m), 7.62 (1H, d, J=8Hz), 7.70 (1H,
br d, J=8Hz), 8.07 (1H, br s)Preparation 57

Phenyl 3-(4-methylbenzenesulfonylaminocarbonyl)-
phenylcarbamate was obtained according to a similar manner to
that of Preparation 55.

NMR (CDCl₃, δ) : 2.38 (3H, br s), 7.11-7.43 (10H, m),
7.51 (1H, br d, J=8Hz), 7.66 (1H, br d, J=8Hz),
7.87 (1H, br s), 7.99 (2H, br d, J=8Hz)

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Preparation 58

(1) A mixture of 2-hydroxypyridine (2.40 g), ethyl 4-iodobenzoate (6.97 g), potassium carbonate (3.83 g) and copper (253 mg) in N,N-dimethylformamide (12 ml) was stirred for 4 hours at 175°C under nitrogen atmosphere. Insoluble material was filtered off, and the filtrate was concentrated in vacuo. To the residue was added ethyl acetate and 1N hydrochloric acid, the organic layer was washed with water, saturated sodium bicarbonate solution and brine, dried over magnesium sulfate and concentrated in vacuo to give ethyl 4-(2-oxo-1,2-dihydropyridin-1-yl)benzoate (2.18 g) as brown powder.

NMR (CDCl₃, δ) : 1.40 (3H, t, J=7.0Hz), 4.40 (2H, q, J=7.0Hz), 6.26 (1H, t, J=7.5Hz), 6.67 (1H, d, J=7.5Hz), 7.32 (1H, d, J=7.5Hz), 7.41 (1H, t, J=7.5Hz), 7.47 (2H, d, J=8.5Hz), 8.17 (2H, d, J=8.5Hz)

(2) 4-(2-Oxo-1,2-dihydropyridin-1-yl)benzyl alcohol was obtained according to a similar manner to that of Preparation 27-(5).

NMR (CDCl₃, δ) : 4.71 (2H, s), 6.23 (1H, t, J=7.5Hz), 6.66 (1H, d, J=7.5Hz), 7.29-7.51 (2H, m), 7.33 (2H, d, J=8.5Hz), 7.46 (2H, d, J=8.5Hz)

(3) 4-(2-Oxo-1,2-dihydropyridin-1-yl)benzaldehyde was obtained according to a similar manner to that of Preparation 32-(7).

NMR (CDCl₃, δ) : 6.31 (1H, t, J=7.5Hz), 6.68 (1H, d, J=7.5Hz), 7.33 (1H, d, J=7.5Hz), 7.42 (1H, t, J=7.5Hz), 7.61 (2H, d, J=8.5Hz), 8.03 (2H, d, J=8.5Hz), 10.08 (1H, s)

(4) 4-(2-Oxo-1,2-dihydropyridin-1-yl)cinnamic acid was

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obtained according to a similar manner to that of Preparation 4.

mp : 279-282°C

5 NMR (CDCl₃-CD₃OD, δ) : 6.37 (1H, t, J=7.5Hz), 6.47 (1H, d, J=16.0Hz), 6.68 (1H, d, J=7.5Hz), 7.33-7.54 (4H, m), 7.67 (2H, d, J=8.5Hz), 7.71 (1H, d, J=16.0Hz)

Example 65

10 (1) 8-Hydroxy-2-methyl-4-(pyrrolidin-1-yl)quinoline was obtained from 4-chloro-8-hydroxy-2-methylquinoline and pyrrolidine according to a similar manner to that of Preparation 16.

mp : 135-137°C

15 NMR (CDCl₃, δ) : 1.99-2.10 (4H, m), 2.56 (3H, s), 3.65-3.76 (4H, m), 6.32 (1H, s), 7.03 (1H, d, J=7.5Hz), 7.16 (1H, t, J=7.5Hz), 7.65 (1H, d, J=7.5Hz)

20 (2) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)-cinnamoylglycyl]amino]benzyloxy]-2-methyl-4-(pyrrolidin-1-yl)quinoline was obtained according to a similar manner to that of Example 9.

25 NMR (CDCl₃, δ) : 1.98-2.06 (4H, m), 2.54 (3H, s), 2.99 (3H, d, J=5Hz), 3.24 (3H, s), 3.59-3.72 (5H, m), 3.93 (1H, dd, J=17, 5Hz), 5.56 (1H, d, J=10Hz), 5.60 (1H, d, J=10Hz), 6.33-6.41 (2H, m), 6.52 (1H, d, J=15Hz), 6.85 (1H, br s), 7.11-7.30 (3H, m), 7.41-7.50 (3H, m), 7.55 (1H, d, J=15Hz), 7.71 (2H, 30 br d, J=8Hz), 7.84 (1H, br d, J=8Hz)

its dihydrochloride

mp : 203-206°C

35 NMR (CDCl₃-CD₃OD, δ) : 2.14-2.26 (4H, m), 2.67 (3H, s), 2.99 (3H, s), 3.29 (3H, s), 3.87 (1H, d,

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J=17Hz), 3.89-4.08 (4H, m), 4.13 (1H, d, J=17Hz), 5.48 (1H, d, J=10Hz), 5.65 (1H, d, J=10Hz), 6.51 (1H, s), 6.62 (1H, d, J=15Hz), 7.33-7.64 (7H, m), 7.81 (2H, d, J=8Hz), 8.02 (1H, d, J=8Hz)

5

Example 66

(1) 9-Hydroxy-2-methyl-4-(4-methylpiperazin-1-yl)quinoline hydrochloride was obtained from 4-chloro-8-hydroxy-2-methylquinoline and 1-methylpiperazine according to a similar manner to that of Preparation 16.

10

mp : >300°C

NMR (DMSO-d₆, δ) : 2.66 (3H, s), 2.46 (3H, br s), 3.10-3.60 (8H, overlapped with H₂O), 7.01-7.11 (2H, m), 7.30-7.42 (2H, m)

15

(2) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)-cinnamoylglycyl]amino]benzyloxy]-2-methyl-4-(4-methylpiperazin-1-yl)quinoline was obtained according to a similar manner to that of Example 9.

20

NMR (CDCl₃, δ) : 2.42 (3H, s), 2.66 (3H, s), 2.67-2.75 (4H, m), 3.01 (3H, d, J=5Hz), 3.19-3.29 (7H, m), 3.68 (1H, dd, J=17, 4Hz), 3.94 (1H, dd, J=17, 5Hz), 5.59 (1H, d, J=10Hz), 5.65 (1H, d, J=10Hz), 6.25 (1H, br d, J=5Hz), 6.53 (1H, d, J=15Hz), 6.70-6.79 (2H, m), 7.18-7.68 (8H, m), 7.75 (2H, br d, J=7.5Hz)

25

its trihydrochloride

NMR (CDCl₃-CD₃OD, δ) : 2.84 (3H, br s), 2.99 (3H, s), 3.04 (3H, br s), 3.30 (3H, s), 3.50-3.59 (2H, m), 3.86-4.02 (4H, m), 4.19-4.29 (4H, m), 5.50 (1H, d, J=10Hz), 5.68 (1H, d, J=10Hz), 6.59 (1H, d, J=15Hz), 7.37-7.81 (11H, m)

30

35 Example 67

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(1) 4-Hexamethyleneimino-8-hydroxy-2-methylquinoline was obtained from 4-chloro-8-hydroxy-2-methylquinoline and hexamethyleneimine according to a similar manner to that of Preparation 16.

5 NMR (CDCl₃, δ) : 1.70-1.80 (4H, m), 1.87-1.99 (4H, m), 2.59 (3H, s), 3.49-3.58 (4H, m), 6.63 (1H, s), 7.03 (1H, d, J=8Hz), 7.21 (1H, t, J=8Hz), 7.46 (1H, d, J=8Hz)

10 (2) 4-Hexamethyleneimino-8-[2,6-dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)cinnaamoylglycyl]amino]benzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Example 9.

15 NMR (CDCl₃, δ) : 1.59-1.80 (4H, m), 1.86-1.97 (4H, m), 2.60 (3H, br s), 2.99 (3H, d, J=5Hz), 3.24 (3H, s), 3.43-3.53 (4H, m), 3.70 (1H, dd, J=17, 4Hz), 3.95 (1H, dd, J=17, 5Hz), 5.57 (2H, s), 6.35 (1H, br s), 6.54 (1H, d, J=15Hz), 6.70 (1H, br s), 7.19 (1H, br d, J=8Hz), 7.27-7.35 (2H, m), 7.41-7.50 (3H, m), 20 7.54 (1H, d, J=15Hz), 7.67-7.75 (3H, m)

its dihydrochloride

25 NMR (CDCl₃-CD₃OD, δ) : 1.69-1.79 (4H, m), 2.00-2.11 (4H, m), 2.69 (3H, s), 2.99 (3H, s), 3.28 (3H, s), 3.86 (1H, d, J=17Hz), 3.90-4.00 (4H, m), 4.24 (1H, br d, J=17Hz), 5.46 (1H, d, J=10Hz), 5.62 (1H, d, J=10Hz), 6.65 (1H, d, J=15Hz), 6.69 (1H, br s), 7.33 (1H, d, J=15Hz), 7.42 (1H, br d, J=8Hz), 7.48-7.61 (5H, m), 7.76-7.84 (3H, m)

30

Example 68

The following compounds were obtained according to a similar manner to that of Example 1.

35 (1) 8-[2,6-Dichloro-3-[N-[4-(dimethylcarbamoyl)-

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cinnamoylglycyl]-N-methylamino]benzyloxy]-4-
dimethylamino-2-methylquinoline

NMR (CDCl₃, δ) : 2.69 (3H, br s), 2.92-3.15 (12H, m),
3.28 (3H, s), 3.70 (1H, br d, J=17Hz), 3.98 (1H, br
d, J=17Hz), 5.62 (2H, br s), 6.53 (1H, br d,
J=15Hz), 6.69 (1H, s), 7.18-7.60 (10H, m), 7.71
(1H, br d, J=8Hz)

its dihydrochloride

NMR (CDCl₃-CD₃OD, δ) : 2.78 (3H, br s), 2.95-3.15 (6H,
m), 3.28 (3H, s), 3.49 (6H, s), 3.85 (1H, d,
J=17Hz), 4.09 (1H, d, J=17Hz), 5.50 (1H, d,
J=10Hz), 5.61 (1H, d, J=10Hz), 6.64 (1H, d,
J=15Hz), 6.71 (1H, br s), 7.32-7.61 (9H, m),
7.79 (1H, br d, J=8Hz)

(2) 8-[2,6-Dichloro-3-[N-methyl-N-[4-[N-(2-pyridylmethyl)-
carbamoyl]cinnamoylglycyl]amino]benzyloxy]-4-
dimethylamino-2-methylquinoline

NMR (CDCl₃, δ) : 2.67 (3H, s), 3.05 (6H, s), 3.27 (3H,
s), 3.66-3.77 (1H, m), 3.91-4.05 (1H, m), 4.76 (2H,
d, J=6Hz), 5.61 (2H, s), 6.57 (1H, d, J=16Hz), 6.67
(1H, s), 7.16-7.74 (13H, m), 7.78-7.85 (2H, m),
8.53-8.60 (1H, m)

its trihydrochloride

NMR (DMSO-d₆, δ) : 2.63 (3H, s), 3.13 (3H, s), 3.42
(6H, s), 3.57 (1H, dd, J=4, 16Hz), 3.90 (1H, dd,
J=4, 16Hz), 4.74 (2H, d, J=6Hz), 5.50-5.63 (2H, m),
6.85-6.97 (2H, m), 7.43 (1H, d, J=16Hz), 7.59 (1H,
t, J=8Hz), 7.64-7.90 (7H, m), 7.90-8.03 (3H, m),
8.23 (1H, t, J=8Hz), 8.40 (1H, t, J=6Hz), 8.71 (1H,
d, J=6Hz), 9.43 (1H, t, J=8Hz), 12.75 (1H, s)

(3) 8-[2,6-Dichloro-3-[N-[4-[N-(2-dimethylaminoethyl)-

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carbamoyl]cinnamoylglycyl]-N-methylamino]benzyloxy]-4-dimethylamino-2-methylquinoline

5 NMR (CDCl₃, δ) : 2.30 (6H, s), 2.56 (1H, br t, J=7Hz),
2.65 (3H, s), 3.00 (6H, s), 3.26 (3H, s), 3.54 (1H,
br q, J=7Hz), 3.69 (1H, dd, J=17, 4Hz), 3.95 (1H,
dd, J=17, 5Hz), 5.59 (1H, d, J=10Hz), 5.64 (1H, d,
J=10Hz), 6.53 (1H, d, J=15Hz), 6.69 (1H, s), 6.78
(1H, br s), 6.98 (1H, br s), 7.20 (1H, br d,
J=8Hz), 7.28-7.38 (2H, m), 7.45-7.55 (3H, m), 7.58
10 (1H, d, J=15Hz), 7.70 (1H, br d, J=8Hz), 7.80 (2H,
br d, J=8Hz)

its trihydrochloride

15 NMR (CDCl₃-CD₃OD, δ) : 2.72 (3H, s), 2.95 (6H, s),
3.00 (6H, s), 3.27 (3H, s), 3.39-3.51 (8H, m),
3.82-3.92 (3H, m), 4.15 (1H, d, J=17Hz), 5.48 (1H,
d, J=10Hz), 5.62 (1H, d, J=10Hz), 6.62 (1H, d,
J=15Hz), 6.70 (1H, s), 7.33 (1H, d, J=15Hz), 7.40-
7.61 (6H, m), 7.80 (1H, br d, J=8Hz), 7.96 (2H, br
20 d, J=8Hz)

(4) 8-[2,6-Dichloro-3-[N-[4-[N-(2-dimethylaminoethyl)-N-methylcarbamoyl]cinnamoylglycyl]-N-methylamino]-benzyloxy]-4-dimethylamino-2-methylquinoline

25 NMR (CDCl₃, δ) : 2.09 (3H, br s), 2.24-2.46 (4H, m),
2.53-2.70 (4H, m), 2.91-3.13 (9H, m), 3.26 (3H, s),
3.34 (1H, m), 3.60-3.73 (2H, m), 3.96 (1H, dd,
J=17, 5Hz), 5.60 (1H, d, J=10Hz), 5.65 (1H, d,
J=10Hz), 6.50 (1H, d, J=15Hz), 6.69 (1H, s), 6.73
30 (1H, br s), 7.20 (1H, d, J=8Hz), 7.28-7.60 (9H, m),
7.70 (1H, br d, J=8Hz)

its trihydrochloride

35 NMR (CDCl₃-CD₃OD, δ) : 2.74 (3H, br s), 2.97 (6H, br
s), 3.10 (3H, br s), 3.28 (3H, br s), 3.38-3.52

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5 (8H, m), 3.88 (1H, br d, J=17Hz), 3.95-4.02 (2H, m), 4.15 (1H, d, J=17Hz), 5.49 (1H, d, J=10Hz), 5.62 (1H, d, J=10Hz), 6.67 (1H, d, J=15Hz), 6.72 (1H, br s), 7.31-7.62 (9H, m), 7.79 (1H, br d, J=8Hz)

10 (5) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(4-pyridylcarbamoyl)-
cinnamoylglycyl]amino]benzyloxy]-4-dimethylamino-2-
methylquinoline
15 NMR (CDCl₃, δ) : 2.45 (3H, s), 3.01 (6H, s), 3.15 (3H, s), 3.61 (1H, dd, J=4, 16Hz), 3.81 (1H, dd, J=4, 16Hz), 5.51 (2H, s), 6.48 (1H, d, J=16Hz), 6.63 (1H, s), 6.87 (1H, br peak), 7.13-7.40 (6H, m), 7.46 (1H, d, J=16Hz), 7.64-7.76 (3H, m), 7.90 (2H, d, J=8Hz), 8.43 (2H, d, J=6Hz), 9.65 (1H, s)

its trihydrochloride

20 NMR (DMSO-d₆, δ) : 2.65 (3H, s), 3.15 (3H, s), 3.42 (6H, s), 3.60 (1H, dd, J=4, 16Hz), 3.93 (1H, dd, J=4, 16Hz), 5.51-5.63 (2H, m), 6.92 (1H, s), 6.97 (1H, d, J=16Hz), 7.49 (1H, d, J=16Hz), 7.55-7.63 (1H, m), 7.72-7.85 (5H, m), 7.95 (1H, d, J=8Hz), 8.13 (2H, d, J=8Hz), 8.35-8.50 (3H, m), 8.77 (2H, d, J=6Hz), 11.76 (1H, s)

25

(6) 8-[2,6-Dichloro-3-[N-[3-methoxy-4-(methylcarbamoyl)-
cinnamoylglycyl]-N-methylamino]benzyloxy]-4-
dimethylamino-2-methylquinoline

30 NMR (CDCl₃, δ) : 2.67 (3H, s), 2.93-3.14 (9H, m), 3.25 (3H, s), 3.66-3.78 (1H, m), 3.89-4.02 (4H, m), 5.55-5.66 (2H, m), 6.52-6.63 (1H, m), 6.68 (1H, s), 7.04 (1H, s), 7.11-7.42 (5H, m), 7.46 (1H, d, J=8Hz), 7.52 (1H, d, J=16Hz), 7.70 (1H, d, J=8Hz), 7.74-7.83 (1H, m), 8.09-8.20 (1H, br peak)

35

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its dihydrochloride

NMR (DMSO-d₆, δ) : 2.61 (3H, s), 2.79 (3H, s), 3.14 (3H, s), 3.40 (6H, s), 3.47-3.65 (1H, m), 3.80-3.96 (4H, m), 5.50-5.63 (2H, m), 6.83-6.97 (2H, m), 7.21 (1H, d, J=8Hz), 7.31 (1H, s), 7.41 (1H, d, J=16Hz), 7.53-7.63 (1H, m), 7.67-7.87 (4H, m), 7.93 (1H, d, J=8Hz), 8.14 (1H, q-like), 8.31 (1H, t-like)

10 (7) 8-[2,6-Dichloro-3-[N-methyl-N-[3-[4-[N-(2-pyridylmethyl)carbamoyl]phenyl]propionylglycyl]amino]-benzyloxy]-4-dimethylamino-2-methylquinoline

15 NMR (CDCl₃, δ) : 2.52 (2H, br t, J=7.5Hz), 2.65 (3H, s), 2.92-3.06 (8H, m), 3.22 (3H, s), 3.49 (1H, br d, J=17Hz), 3.80 (1H, dd, J=17, 4Hz), 4.74 (2H, d, J=5Hz), 5.60 (2H, s), 6.68 (1H, br s), 7.17-7.36 (8H, m), 7.43-7.55 (2H, m), 7.63-7.80 (4H, m), 8.56 (1H, br d, J=5Hz)

its trihydrochloride

20 NMR (CDCl₃-CD₃OD, δ) : 2.50-2.63 (4H, m), 2.90 (1H, m), 3.25 (3H, s), 3.51 (6H, s), 3.69 (1H, d, J=17Hz), 3.78 (1H, d, J=17Hz), 4.99 (2H, s), 5.48 (1H, d, J=10Hz), 5.63 (1H, d, J=10Hz), 6.80 (1H, br s), 7.18 (2H, d, J=8Hz), 7.40-7.61 (4H, m), 7.79-7.90 (4H, m), 8.11 (1H, br d, J=8Hz), 8.39 (1H, br t, J=8Hz), 8.73 (1H, br d, J=5Hz)

30 (8) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(methanesulfonamido)-cinnamoylglycyl]amino]benzyloxy]-4-dimethylamino-2-methylquinoline

35 NMR (CDCl₃, δ) : 2.64 (3H, s), 3.01 (6H, s), 3.26 (3H, s), 3.68 (1H, dd, J=4, 18Hz), 3.95 (1H, dd, J=4, 18Hz), 5.53-5.64 (2H, m), 6.41 (1H, d, J=16Hz), 6.67 (1H, s), 6.81 (1H, br peak), 7.11-7.38 (6H, m), 7.38-7.53 (4H, m), 7.70 (1H, d, J=8Hz)

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its dihydrochloride

NMR (DMSO-d₆, δ) : 2.63 (3H, s), 3.03 (3H, s), 3.13 (3H, s), 3.41 (6H, s), 3.55 (1H, dd, J=4, 18Hz), 3.90 (1H, dd, J=4, 18Hz), 5.53 (1H, d, J=10Hz), 5.59 (1H, d, J=10Hz), 6.68 (1H, d, J=16Hz), 6.92 (1H, s), 7.23 (2H, d, J=8Hz), 7.32 (1H, d, J=16Hz), 7.52 (2H, d, J=8Hz), 7.58 (1H, t, J=8Hz), 7.72-7.83 (3H, m), 7.94 (1H, d, J=8Hz), 8.29 (1H, t-like), 10.03 (1H, s)

(9) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(isonicotinamido)-cinnamoylglycyl]amino]benzyloxy]-2-methyl-4-dimethylaminoquinoline

NMR (CDCl₃-CD₃OD, δ) : 2.58 (3H, s), 3.04 (6H, br), 3.25 (3H, s), 3.39 (1H, m), 3.69 (2H, m), 4.00 (1H, d, J=15Hz), 5.54 (2H, m), 6.48 (1H, d, J=15Hz), 6.69 (1H, s), 7.20 (1H, d, J=8Hz), 7.36-7.52 (6H, m), 7.70 (3H, m), 7.83 (2H, d, J=8Hz), 8.70 (2H, d, J=8Hz)

its trihydrochloride

NMR (CDCl₃-CD₃OD, δ) : 2.70 (3H, s), 3.29 (3H, s), 3.52 (6H, s), 3.88-4.04 (4H, m), 5.49 (1H, d, J=15Hz), 5.68 (1H, d, J=15Hz), 6.51 (1H, d, J=15Hz), 6.70 (1H, s), 7.36-7.64 (7H, m), 7.84 (1H, d, J=8Hz), 7.92 (2H, d, J=8Hz), 8.66 (2H, d, J=8Hz), 8.99 (2H, d, J=8Hz)

(10) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(2-oxopyrrolidin-1-yl)cinnamoylglycyl]amino]benzyloxy]-4-dimethylamino-2-methylquinoline

NMR (CDCl₃, δ) : 2.10-2.23 (2H, m), 2.61 (2H, t, J=7.5Hz), 2.67 (3H, s), 3.03 (6H, s), 3.26 (3H, s), 3.63-3.75 (1H, m), 3.86 (2H, t, J=7.5Hz), 3.90-4.02 (1H, m), 5.60 (2H, s), 6.45 (1H, d, J=16Hz), 6.67

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(1H, s), 7.16-7.28 (2H, m), 7.28-7.41 (2H, m),
7.41-7.56 (4H, m), 7.62 (2H, d, J=8Hz), 7.70 (1H,
d, J=8Hz)

5 its dihydrochloride

NMR (DMSO-d₆, δ) : 2.00-2.13 (2H, m), 2.62 (3H, s),
3.13 (3H, s), 3.41 (6H, s), 3.46-3.61 (1H, m),
3.80-3.97 (3H, m), 5.53 (1H, d, J=10Hz), 5.60 (1H,
d, J=10Hz), 6.71 (1H, d, J=16Hz), 6.92 (1H, s),
10 7.33 (1H, d, J=16Hz), 7.52-7.63 (2H, m), 7.67-7.86
(5H, m), 7.93 (1H, d, J=8Hz), 8.30 (1H, t, J=6Hz),
12.75 (1H, s)

15 (11) 8-[2,6-Dichloro-3-[N-[4-[N-(2-methoxyacetyl)-N-(3-
pyridylmethyl)amino]cinnamoylglycyl]-N-methylamino]-
benzyloxy]-2-methyl-4-dimethylaminoquinoline

NMR (CDCl₃, δ) : 2.68 (3H, s), 3.07 (6H, s), 3.26 (3H,
s), 3.36 (3H, s), 3.63-4.00 (2H, m), 3.78 (2H, s),
4.88 (2H, s), 5.59 (2H, s), 6.50 (1H, d, J=15Hz),
20 6.67 (1H, s), 6.93 (2H, d, J=8Hz), 7.20 (2H, m),
7.30 (2H, m), 7.41-7.52 (4H, m), 7.63 (1H, d,
J=8Hz), 7.68 (1H, d, J=8Hz), 8.34 (1H, br), 8.50
(1H, d, J=7Hz)

25 its trihydrochloride

NMR (CDCl₃-CD₃OD, δ) : 2.70 (3H, br), 3.28 (3H, s),
3.36 (3H, s), 3.53 (6H, br), 3.83-4.10 (2H, m),
3.88 (2H, br), 5.09 (2H, br), 5.49 (1H, d, J=15Hz),
5.68 (1H, d, J=15Hz), 6.63-6.79 (2H, m), 7.17 (2H,
30 br), 7.40 (1H, m), 7.48 (1H, d, J=8Hz), 7.58 (4H,
br), 7.83 (1H, d, J=8Hz), 8.04 (1H, br), 8.57 (1H,
br), 8.75 (1H, br), 8.80 (1H, br)

35 (12) 8-[3-[N-(4-Acetamido-3-methylcinnamoylglycyl)-N-
methylamino]-2,6-dichlorobenzyloxy]-2-methyl-4-

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dimethylaminoquinoline

5 NMR (CDCl₃, δ) : 2.20 (3H, s), 2.27 (3H, s), 2.65 (3H, s), 3.00 (6H, s), 3.25 (3H, s), 3.65 (1H, dd, J=7, 15Hz), 3.94 (1H, dd, J=7, 15Hz), 5.61 (2H, m), 6.40 (1H, d, J=15Hz), 6.68 (2H, s), 7.06 (1H, br), 7.20 (1H, d, J=8Hz), 7.27-7.36 (4H, m), 7.44-7.52 (2H, m), 7.69 (1H, d, J=8Hz), 7.90 (1H, d, J=8Hz)

its dihydrochloride

10 NMR (CDCl₃-CD₃OD, δ) : 2.22 (3H, s), 2.28 (3H, s), 2.70 (3H, s), 3.28 (3H, s), 3.49 (6H, s), 3.91 (2H, m), 5.48 (1H, d, J=8Hz), 5.67 (1H, d, J=8Hz), 6.47 (1H, d, J=15Hz), 6.70 (1H, s), 7.27-7.38 (3H, m), 7.47-7.63 (6H, m), 7.83 (1H, d, J=8Hz)

15 (13) 8-[3-[N-[(E)-3-(1-Acetyl-1,2,3,4-tetrahydroquinolin-6-yl)acryloyl]glycyl]-N-methylamino]-2,6-

dichlorobenzyloxy]-4-dimethylamino-2-methylquinoline

20 NMR (CDCl₃, δ) : 1.96 (2H, quint, J=7Hz), 2.26 (3H, s), 2.68 (3H, s), 2.72 (2H, t, J=7Hz), 3.02 (6H, s), 3.27 (3H, s), 3.67 (1H, dd, J=4, 18Hz), 3.77 (2H, t, J=7Hz), 3.95 (1H, dd, J=5, 18Hz), 5.55-5.67 (2H, m), 6.45 (1H, d, J=16Hz), 6.69 (1H, s), 6.80 (1H, br peak), 7.22 (1H, d, J=8Hz), 7.25-7.39 (5H, m), 7.47 (1H, d, J=8Hz), 7.52 (1H, d, J=16Hz), 7.70 (1H, d, J=8Hz)

its dihydrochloride

30 NMR (DMSO-d₆, δ) : 1.87 (2H, quint, J=7Hz), 2.20 (3H, s), 2.63 (3H, s), 2.72 (2H, t, J=7Hz), 3.15 (3H, s), 3.42 (6H, s), 3.51-3.81 (3H, m), 3.91 (1H, dd, J=5, 16Hz), 5.52-5.63 (2H, m), 6.72 (1H, d, J=16Hz), 6.93 (1H, s), 7.26-7.41 (3H, m), 7.50-7.65 (2H, m), 7.75 (1H, d, J=8Hz), 7.81 (2H, s-like), 7.94 (1H, d, J=8Hz), 8.27 (1H, t-like)

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- (14) 8-[2,6-Dichloro-3-[N-[(E)-3-(6-ethoxycarbonylpyridin-3-yl)acryloylglycyl]-N-methylamino]benzyloxy]-4-dimethylamino-2-methylquinoline

5 NMR (CDCl₃, δ) : 1.45 (1H, t, J=7.5Hz), 2.62 (3H, s),
3.00 (6H, br s), 3.28 (3H, s), 3.72 (1H, br dd,
J=17, 4Hz), 3.95 (1H, br dd, J=17, 5Hz), 4.49 (2H,
q, J=7.5Hz), 5.60 (1H, d, J=10Hz), 5.65 (1H, d,
J=10Hz), 6.63-6.72 (2H, m), 6.88 (1H, br s), 7.20
10 (1H, br d, J=8Hz), 7.29-7.38 (2H, m), 7.48 (1H, d,
J=8Hz), 7.60 (1H, d, J=15Hz), 7.70 (1H, d, J=8Hz),
7.90 (1H, dd, J=8, 2Hz), 8.10 (1H, br d, J=8Hz),
8.83 (1H, br s)

- 15 (15) 8-[3-[N-[(E)-3-(6-Aminopyridin-3-yl)acryloylglycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-4-dimethylamino-2-methylquinoline

20 NMR (CDCl₃, δ) : 2.63 (3H, s), 2.98 (6H, s), 3.24 (3H,
s), 3.64 (1H, dd, J=4, 17Hz), 3.93 (1H, dd, J=4,
17Hz), 4.67 (2H, s), 5.55-5.67 (2H, m), 6.29 (1H,
d, J=16Hz), 6.46 (1H, d, J=8Hz), 6.55 (1H,
t-like), 6.69 (1H, s), 7.18 (1H, d, J=8Hz), 7.22-
7.36 (2H, m), 7.40-7.50 (2H, m), 7.58 (1H, d,
J=8Hz), 7.69 (1H, d, J=8Hz), 8.16 (1H, s)

- 25 (16) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-[(E)-2-(pyridin-4-yl)vinyl]pyridin-3-yl]acryloylglycyl]amino]benzyloxy]-4-dimethylamino-2-methylquinoline

30 NMR (CDCl₃, δ) : 2.67 (3H, s), 3.03 (6H, s), 3.27 (3H,
s), 3.66-3.80 (1H, m), 3.91-4.05 (1H, m), 5.56-5.68
(2H, m), 6.61 (1H, d, J=16Hz), 6.70 (1H, s), 7.15-
7.66 (11H, m), 7.66-7.77 (1H, m), 7.77-7.85 (1H,
m), 8.61 (2H, d, J=6Hz), 8.69-8.75 (1H, m)

its tetrahydrochloride

35 NMR (DMSO-d₆, δ) : 2.63 (3H, s), 3.15 (3H, s), 3.43

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(6H, s), 3.91 (1H, dd, J=4, 18Hz), 5.51-5.64 (2H, m), 6.93 (1H, s), 7.00 (1H, d, J=16Hz), 7.47 (1H, d, J=16Hz), 7.59 (1H, t, J=8Hz), 7.73-8.15 (8H, m), 8.29 (2H, d, J=6Hz), 8.44 (1H, t-like), 8.85-8.93 (3H, m)

5

(17) 8-[2,6-Dichloro-3-[N-[4-(dimethylcarbamoyl)-cinnamoyl]glycyl]-N-methylamino]benzyloxy]-2-methyl-4-piperidinoquinoline

10 NMR (CDCl₃, δ) : 1.60-1.75 (2H, overlapped with H₂O), 1.79-1.90 (4H, m), 2.68 (3H, br s), 2.98 (3H, br s), 3.06-3.29 (10H, m), 3.70 (1H, br d, J=17Hz), 3.97 (1H, br d, J=17Hz), 5.60 (2H, br s), 6.52 (1H, br d, J=15Hz), 6.71 (1H, s), 7.20 (1H, br d, J=8Hz), 7.27-7.60 (9H, m), 7.62 (1H, br d, J=8Hz)

15

its dihydrochloride

NMR (CDCl₃-CD₃OD, δ) : 1.82-1.94 (6H, m), 2.84 (3H, br s), 3.00 (3H, br s), 3.10 (3H, br s), 3.39 (3H, s), 3.67-3.76 (4H, m), 3.89 (1H, br d, J=17Hz), 4.12 (1H, br d, J=17Hz), 5.51 (1H, d, J=10Hz), 5.61 (1H, d, J=10Hz), 6.68 (1H, d, J=15Hz), 6.84 (1H, br s), 7.32-7.61 (10H, m)

20

25 (18) 8-[2,6-Dichloro-3-[N-methyl-N-[4-[N-(2-pyridylmethyl)-carbamoyl]cinnamoyl]glycyl]amino]benzyloxy]-2-methyl-4-piperidinoquinoline

NMR (CDCl₃, δ) : 1.24 (2H, t, J=7Hz), 1.80 (4H, br), 2.66 (3H, s), 3.17 (4H, br), 3.25 (3H, s), 3.70 (1H, m), 3.96 (1H, dd, J=7, 15Hz), 4.75 (2H, d, J=7Hz), 5.58 (2H, m), 6.55 (1H, d, J=15Hz), 6.72 (1H, s), 7.20 (2H, m), 7.29-7.38 (3H, m), 7.44-7.77 (7H, m), 7.80-7.91 (2H, m), 8.55 (1H, d, J=7Hz)

30

35 its trihydrochloride

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NMR (CD₃OD, δ) : 1.67 (6H, br), 2.49 (3H, s), 3.07 (3H, s), 3.58 (4H, br), 3.60-3.83 (2H, m), 4.65 (2H, br (overlap)), 5.42 (1H, d, J=8Hz), 5.50 (1H, d, J=8Hz), 6.58 (1H, d, J=15Hz), 6.83 (1H, s), 7.31 (1H, d, J=15Hz), 7.40-7.58 (6H, m), 7.19-7.83 (4H, m), 8.30 (2H, m), 8.52 (2H, br)

(19) 8-[2,6-Dichloro-3-[N-[3-methoxy-4-(methylcarbamoyl)-cinnamoylglycyl]-N-methylamino]benzyloxy]-2-methyl-4-piperidinoquinoline

NMR (CDCl₃, δ) : 1.57-1.74 (2H, overlapped with H₂O), 1.79-1.90 (4H, m), 2.65 (3H, br s), 3.00 (3H, d, J=5Hz), 3.19-3.22 (4H, m), 3.26 (3H, s), 3.70 (1H, br d, J=17Hz), 3.90-4.01 (5H, m), 5.58 (1H, d, J=10Hz), 5.64 (1H, d, J=10Hz), 6.57 (1H, br d, J=15Hz), 6.70-6.80 (2H, m), 7.04 (1H, br s), 7.16-7.39 (4H, m), 7.48 (1H, d, J=8Hz), 7.52 (1H, br d, J=15Hz), 7.64 (1H, br d, J=8Hz), 7.79 (1H, br d, J=5Hz), 8.19 (1H, br s)

its dihydrochloride

NMR (CDCl₃-CD₃OD, δ) : 1.81-1.95 (6H, m), 2.82 (3H, br s), 3.00 (3H, s), 3.28 (3H, s), 3.69-3.78 (4H, m), 3.88 (1H, br d, J=17Hz), 4.04 (3H, s), 4.20 (1H, br d, J=17Hz), 5.50 (1H, br d, J=10Hz), 5.61 (1H, br d, J=10Hz), 6.73-6.86 (2H, m), 7.04 (1H, d, J=8Hz), 7.21 (1H, br s), 7.33-7.61 (6H, m), 8.01 (1H, br d, J=8Hz)

(20) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(isonicotinamido)-cinnamoylglycyl]amino]benzyloxy]-2-methyl-4-piperidinoquinoline

NMR (CDCl₃, δ) : 1.58-1.90 (6H, m), 2.51 (3H, br s), 3.14-3.27 (7H, m), 3.62 (1H, br d, J=17Hz), 3.89 (1H, br dd, J=17, 5Hz), 5.52 (2H, s), 6.41 (1H, d,

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J=15Hz), 6.70 (1H, s), 7.18-7.31 (4H, m), 7.37-7.44 (3H, m), 7.49 (1H, br d, J=15Hz), 7.64 (1H, br d, J=18Hz), 7.72 (2H, d, J=8Hz), 7.78 (2H, d, J=5Hz), 8.63 (2H, d, J=5Hz), 9.35 (1H, br s)

5

its trihydrochloride

NMR (CDCl₃-CD₃OD, δ) : 1.81-1.96 (6H, m), 2.76 (3H, br s), 3.28 (3H, s), 3.70-3.80 (4H, m), 3.88 (1H, br d, J=17Hz), 4.11 (1H, br d, J=17Hz), 5.48 (1H, d, J=10Hz), 5.66 (1H, d, J=10Hz), 6.50 (1H, br d, J=15Hz), 6.86 (1H, br s), 7.24-7.63 (8H, m), 7.92 (2H, br d, J=8Hz), 8.70 (2H, d, J=5Hz), 8.95 (2H, d, J=5Hz)

10

15 (21) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(2-oxopyrrolidin-1-yl)cinnaoylglycyl]amino]benzyloxy]-2-methyl-4-piperidinoquinoline

NMR (CDCl₃, δ) : 1.25 (2H, t, J=7Hz), 1.84 (4H, br), 2.15 (2H, m), 2.60 (2H, t, J=7Hz), 2.65 (3H, s), 20 3.16 (4H, br), 3.27 (3H, s), 3.65 (1H, dd, J=7, 15Hz), 3.87 (2H, t, J=7Hz), 3.93 (1H, dd, J=7, 15Hz), 5.60 (2H, m), 6.44 (1H, d, J=15Hz), 6.72 (1H, s), 6.80 (1H, br), 7.18 (1H, d, J=8Hz), 7.30-7.37 (2H, m), 7.46-7.66 (7H, m)

25

its dihydrochloride

NMR (CD₃OD, δ) : 1.84 (6H, br), 2.19 (2H, m), 2.58-2.66 (2H, m), 2.69 (3H, s), 3.27 (3H, s), 3.78 (4H, br), 3.85-4.03 (2H, m), 5.60 (1H, d, J=8Hz), 5.72 30 (1H, d, J=8Hz), 6.60 (1H, d, J=15Hz), 7.06 (1H, s), 7.46 (1H, d, J=15Hz), 7.54 (2H, m), 7.62-7.75 (7H, m)

35

(22) 8-[3-[N-[(E)-3-(1-Acetyl-1,2,3,4-tetrahydroquinolin-6-yl)acryloylglycyl]-N-methylamino]-2,6-

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dichlorobenzyloxy]-2-methyl-4-piperidinoquinoline
and
its dihydrochloride

- 5 (23) 8-[2,6-Dichloro-3-[N-[(E)-3-(6-ethoxycarbonylpyridin-3-yl)acryloylglycyl]-N-methylamino]benzyloxy]-2-methyl-4-piperidinoquinoline
- 10 NMR (CDCl₃, δ) : 1.43 (1H, t, J=7.5Hz), 1.59-1.74 (2H, overlapped with H₂O), 1.78-1.90 (4H, m), 2.65 (3H, br s), 3.09-3.22 (4H, m), 3.27 (3H, s), 3.74 (1H, br d, J=17Hz), 3.97 (1H, br d, J=17Hz), 4.48 (2H, q, J=7.5Hz), 5.60 (1H, s), 6.64-6.75 (2H, m), 6.89 (1H, br s), 7.16-7.40 (3H, m), 7.47 (1H, br d, J=8Hz), 7.52-7.67 (2H, m), 7.90 (1H, br d, J=8Hz), 8.08 (1H, br d, J=8Hz), 8.70 (1H, br s)
- 15
- (24) 8-[3-[N-[(E)-3-[6-(Acetamido)pyridin-3-yl]-acryloylglycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methyl-4-piperidinoquinoline
- 20 NMR (CDCl₃, δ) : 1.10-1.26 (2H, m), 1.82 (4H, br), 2.19 (3H, s), 2.63 (3H, s), 3.15 (4H, br), 3.24 (3H, s), 3.68 (1H, dd, J=7, 15Hz), 3.94 (1H, dd, J=7, 15Hz), 5.60 (2H, m), 6.47 (1H, d, J=15Hz), 6.72 (1H, s), 6.83 (1H, br), 7.18 (1H, d, J=8Hz), 7.27-7.39 (2H, m), 7.46 (1H, d, J=8Hz), 7.52 (1H, d, J=15Hz), 7.63 (1H, d, J=8Hz), 7.80 (1H, dd, J=4, 8Hz), 8.17 (1H, d, J=8Hz), 8.26 (1H, br), 8.32 (1H, s)
- 25
- 30 (25) 8-[3-[N-[(E)-3-(6-Aminopyridin-3-yl)acryloylglycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methyl-4-piperidinoquinoline
- NMR (CDCl₃, δ) : 1.55-1.72 (2H, m), 1.77-1.88 (4H, m), 2.64 (3H, s), 3.07-3.18 (4H, m), 3.24 (3H, s), 3.64 (1H, dd, J=4, 18Hz), 3.93 (1H, dd, J=4, 18Hz),
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5 4.66 (2H, s), 5.57 (1H, d, J=10Hz), 5.63 (1H, d, J=10Hz), 6.29 (1H, d, J=15Hz), 6.47 (1H, d, J=8Hz), 6.59 (1H, t-like), 6.73 (1H, s), 7.13 (1H, d, J=8Hz), 7.23-7.37 (2H, m), 7.40-7.50 (2H, m), 7.59 (1H, dd, J=2, 8Hz), 7.64 (1H, d, J=8Hz), 8.16 (1H, d, J=2Hz)

10 (26) 8-[2,6-Dichloro-3-[N-[4-(dimethylcarbamoyl)-cinnamoylglycyl]-N-methylamino]benzyloxy]-2-methyl-4-morpholinoquinoline

15 NMR (CDCl₃, δ) : 2.69 (3H, s), 2.99 (3H, br s), 3.11 (3H, br s), 3.17-3.24 (4H, m), 3.28 (3H, s), 3.67 (1H, br dd, J=17, 4Hz), 3.90-4.01 (5H, m), 5.60 (1H, d, J=10Hz), 5.65 (1H, d, J=10Hz), 6.50 (1H, d, J=15Hz), 6.69 (1H, br s), 6.78 (1H, s), 7.19-7.53 (8H, m), 7.58 (1H, d, J=15Hz), 7.66 (1H, br d, J=8Hz)

its dihydrochloride

20 NMR (CDCl₃-CD₃OD, δ) : 2.91 (3H, s), 2.97-3.14 (6H, m), 3.29 (3H, s), 3.72-3.81 (4H, m), 3.88 (1H, br d, J=17Hz), 3.96-4.05 (5H, m), 5.53 (1H, d, J=10Hz), 5.64 (1H, d, J=10Hz), 6.65 (1H, d, J=15Hz), 7.06 (1H, br s), 7.37 (2H, d, J=8Hz),
25 7.42-7.68 (8H, m)

30 (27) 8-[2,6-Dichloro-3-[N-methyl-N-[4-[N-(2-pyridylmethyl)-carbamoyl]cinnamoylglycyl]amino]benzyloxy]-2-methyl-4-morpholinoquinoline

35 NMR (CDCl₃, δ) : 2.68 (3H, s), 3.22 (4H, m), 3.28 (3H, s), 3.64-3.77 (2H, m), 3.95 (4H, m), 4.74 (2H, d, J=7Hz), 5.60 (2H, m), 6.54 (1H, d, J=15Hz), 6.78 (1H, s), 7.00 (1H, br), 7.20-7.25 (2H, m), 7.29-7.42 (3H, m), 7.45-7.73 (7H, m), 7.76-7.90 (2H, m)

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its trihydrochloride

NMR (CD₃OD, δ) : 2.74 (3H, s), 3.26 (3H, s), 3.78-3.87 (6H, m), 3.95 (4H, m), 4.90 (2H, s), 5.65 (1H, d, J=8Hz), 5.73 (1H, d, J=8Hz), 6.79 (1H, d, J=15Hz), 7.13 (1H, s), 7.54 (1H, d, J=15Hz), 7.66-7.79 (8H, m), 7.93-8.05 (4H, m), 8.09 (1H, d, J=8Hz), 8.60 (1H, t, J=8Hz), 8.78 (1H, d, J=8Hz)

(28) 8-[2,6-Dichloro-3-[N-[3-methoxy-4-(methylcarbamoyl)-cinnamoylglycyl]-N-methylamino]benzyloxy]-2-methyl-4-morpholinoquinoline

NMR (CDCl₃, δ) : 2.67 (3H, br s), 3.00 (3H, d, J=5Hz), 3.16-3.22 (4H, m), 3.27 (3H, s), 3.69 (1H, br dd, J=17, 4Hz), 3.89-4.01 (7H, m), 5.59 (1H, d, J=10Hz), 5.64 (1H, d, J=10Hz), 6.55 (1H, d, J=15Hz), 6.72 (1H, br s), 6.78 (1H, s), 7.21 (1H, br d, J=8Hz), 7.30 (1H, d, J=8Hz), 7.37 (1H, t, J=8Hz), 7.48 (1H, d, J=8Hz), 7.53 (1H, d, J=15Hz), 7.66 (1H, br d, J=8Hz), 7.79 (1H, br d, J=5Hz), 8.20 (1H, d, J=8Hz)

its dihydrochloride

NMR (CDCl₃-CD₃OD, δ) : 2.90 (3H, br s), 2.99 (3H, s), 3.28 (3H, s), 3.73-3.81 (4H, m), 3.87 (1H, d, J=17Hz), 3.97-4.07 (7H, m), 4.15 (1H, d, J=17Hz), 5.52 (1H, d, J=10Hz), 5.62 (1H, d, J=10Hz), 6.76 (1H, d, J=15Hz), 7.00-7.09 (2H, m), 7.18 (1H, s), 7.37-7.68 (6H, m), 7.98 (2H, d, J=8Hz)

(29) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(isonicotinamido)-cinnamoylglycyl]amino]benzyloxy]-2-methyl-4-morpholinoquinoline

NMR (CDCl₃, δ) : 2.52 (3H, br s), 3.13-3.25 (7H, m), 3.60 (1H, dd, J=17, 4Hz), 3.85 (1H, dd, J=17, 5Hz), 3.93-4.02 (4H, m), 5.56 (2H, s), 6.40 (1H, d,

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J=15Hz), 6.63 (1H, br s), 6.72 (1H, s), 7.17-7.34 (3H, m), 7.38-7.47 (3H, m), 7.50 (1H, d, J=15Hz), 7.63-7.77 (5H, m), 8.66 (2H, br d, J=8Hz), 9.11 (1H, br s)

5

its trihydrochloride

NMR (CDCl₃-CD₃OD, δ) : 2.83 (3H, br s), 3.28 (3H, s), 3.70-3.87 (5H, m), 3.92-4.03 (4H, m), 4.16 (1H, br d, J=17Hz), 5.48 (1H, br d, J=10Hz), 5.67 (1H, br d, J=10Hz), 6.54 (1H, br s), 7.07 (1H, br s), 7.24-7.68 (8H, m), 7.89-7.99 (2H, m), 8.71-8.93 (4H, m)

10

(30) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(2-oxopyrrolidin-1-yl)cinnamoylglycyl]amino]benzyloxy]-2-methyl-4-morpholinoquinoline

15

NMR (CDCl₃, δ) : 2.18 (2H, m), 2.62 (2H, t, J=7Hz), 2.67 (3H, s), 3.22 (4H, br), 3.26 (3H, s), 3.60-3.73 (2H, m), 3.87 (2H, m), 3.96 (4H, m), 5.60 (2H, m), 6.40 (1H, d, J=15Hz), 6.76 (2H, br), 7.19 (1H, d, J=8Hz), 7.29-7.38 (2H, m), 7.46-7.50 (4H, m), 7.59-7.68 (3H, m)

20

its dihydrochloride

NMR (CD₃OD, δ) : 2.19 (2H, m), 2.61 (2H, t, J=7Hz), 2.74 (3H, s), 3.28 (3H, s), 3.79 (4H, m), 3.88-3.98 (8H, m), 5.63 (1H, d, J=8Hz), 5.72 (1H, d, J=8Hz), 6.60 (1H, d, J=15Hz), 7.12 (1H, s), 7.44 (1H, d, J=15Hz), 7.54 (2H, d, J=8Hz), 7.60-7.78 (7H, m)

25

(31) 8-[3-[N-[(E)-3-(1-Acetyl-1,2,3,4-tetrahydroquinolin-6-yl)acryloylglycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methyl-4-morpholinoquinoline and its dihydrochloride

30

35

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(32) 8-[2,6-Dichloro-3-[N-[(E)-3-(6-ethoxycarbonylpyridin-3-yl)acryloylglycyl]-N-methylamino]benzyloxy]-2-methyl-4-morpholinoquinoline

5 NMR (CDCl₃, δ) : 1.45 (1H, t, J=7.5Hz), 2.66 (3H, s),
3.17-3.25 (4H, m), 3.29 (3H, s), 3.73 (1H, br dd,
J=17, 4Hz), 3.90-4.02 (5H, m), 4.50 (2H, q,
J=7.5Hz), 5.60 (1H, d, J=10Hz), 5.66 (1H, d,
J=10Hz), 6.67 (1H, d, J=15Hz), 6.78 (1H, s), 6.83
10 (1H, br s), 7.20-7.28 (1H, overlapped with CDCl₃),
7.31 (1H, d, J=8Hz), 7.39 (1H, t, J=8Hz), 7.60 (1H,
d, J=15Hz), 7.68 (1H, br d, J=8Hz), 7.91 (1H, br d,
J=8Hz), 8.11 (1H, br d, J=8Hz), 8.73 (1H, br s)

15 (33) 8-[3-[N-[(E)-3-[6-(Acetamido)pyridin-3-yl]-
acryloylglycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-
methyl-4-morpholinoquinoline

20 NMR (CDCl₃, δ) : 2.21 (3H, s), 2.67 (3H, s), 3.15-
3.23 (4H, m), 3.36 (3H, s), 3.70 (1H, dd, J=17,
4Hz), 3.88-4.01 (5H, m), 5.58 (1H, d, J=10Hz), 5.63
(1H, d, J=10Hz), 6.47 (1H, d, J=15Hz), 6.39-6.79
(2H, m), 7.19-7.28 (1H, overlapped with CDCl₃),
7.30 (1H, d, J=8Hz), 7.37 (1H, t, J=8Hz), 7.47 (1H,
d, J=8Hz), 7.51 (1H, d, J=15Hz), 7.65 (1H, d,
J=8Hz), 7.80 (1H, br d, J=8Hz), 8.09 (1H, br s),
25 8.19 (1H, br d, J=8Hz), 8.33 (1H, br s)

(34) 8-[3-[N-[(E)-3-(6-Aminopyridin-3-yl)acryloylglycyl]-N-
methylamino]-2,6-dichlorobenzyloxy]-2-methyl-4-
morpholinoquinoline

30 NMR (CDCl₃, δ) : 2.67 (3H, s), 3.19 (4H, m), 3.28 (3H,
s), 3.73 (2H, m), 3.98 (4H, m), 4.71 (2H, br), 5.61
(2H, m), 6.29 (1H, d, J=15Hz), 6.47 (1H, d, J=8Hz),
6.60 (1H, m), 6.77 (1H, s), 7.21 (1H, m), 7.28-7.39
(2H, m), 7.43-7.49 (2H, m), 7.60 (1H, d, J=8Hz),
35 7.66 (1H, d, J=8Hz), 8.18 (1H, s)

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(35) 8-[2,6-Dichloro-3-[N-methyl-N-{4-[(E)-2-(pyridin-4-yl)vinyl]cinnamoylglycyl]amino]benzyloxy]-2-methylquinoline

5 NMR (CDCl₃, δ) : 2.73 (3H, s), 3.28 (3H, s), 3.67 (1H, dd, J=17, 4Hz), 3.96 (1H, d, J=14, 5Hz), 5.64 (2H, s), 6.50 (1H, d, J=15Hz), 6.67 (1H, br s), 7.04 (1H, d, J=16Hz), 7.23-7.61 (14H, m), 8.02 (1H, d, J=8Hz), 8.59 (2H, d, J=7Hz)

10 its dihydrochloride

15 NMR (CDCl₃-CD₃OD, δ) : 3.23 (3H, br s), 3.31 (3H, s), 3.91 (1H, d, J=17Hz), 4.09 (1H, d, J=17Hz), 5.62 (1H, d, J=10Hz), 5.70 (1H, d, J=10Hz), 6.68 (1H, br d, J=15Hz), 7.14 (1H, br d, J=15Hz), 7.43 (1H, br d, J=15Hz), 7.50-7.64 (8H, m), 7.77 (1H, d, J=8Hz), 7.82-7.98 (4H, m), 8.64-8.73 (2H, m), 8.82 (1H, br d, J=8Hz)

(36) 8-[2,6-Dichloro-3-[N-[3-methoxy-4-(methylcarbamoyl)-cinnamoylglycyl]-N-methylamino]benzyloxy]-2-methylquinoline

20 NMR (CDCl₃, δ) : 2.72 (3H, s), 3.01 (3H, d, J=5Hz), 3.28 (3H, s), 3.68 (1H, dd, J=4, 18Hz), 3.89-4.02 (4H, m), 5.60-5.70 (2H, m), 6.55 (1H, d, J=16Hz), 6.70 (1H, t-like), 7.04 (1H, s-like), 7.18-7.36 (5H, m), 7.38-7.60 (3H, m), 7.78 (1H, q-like), 8.03 (1H, d, J=8Hz), 8.21 (1H, d, J=8Hz)

30 its hydrochloride

35 NMR (DMSO-d₆, δ) : 2.79 (3H, d, J=5Hz), 2.92 (3H, s), 3.16 (3H, s), 3.60 (1H, dd, J=4, 16Hz), 3.83-3.96 (4H, m), 5.58-5.71 (2H, m), 6.93 (1H, d, J=16Hz), 7.23 (1H, d, J=8Hz), 7.30-7.46 (2H, m), 7.73-8.01 (7H, m), 8.16 (1H, q-like), 8.32 (1H, t-like), 8.94-9.06 (1H, br peak)

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(37) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(2-oxo-1,2-dihydropyridin-1-yl)cinnaoylglycyl]amino]benzyloxy]-2-methylquinoline

mp : 160.5-172°C

5 NMR (CDCl₃, δ) : 2.73 (3H, s), 3.26 (3H, s), 3.64 (1H, dd, J=17.5, 4.0Hz), 3.94 (1H, dd, J=17.5, 5.5Hz), 5.63 (1H, d, J=11.5Hz), 5.68 (1H, d, J=11.5Hz), 6.23 (1H, t, J=7.5Hz), 6.50 (1H, d, J=16.0Hz), 6.66 (1H, d, J=7.5Hz), 6.67 (1H, m), 7.22-7.34 (4H, m), 7.36-7.52 (6H, m), 7.60 (1H, d, J=16.0Hz), 7.61 (2H, d, J=8.5Hz), 8.01 (1H, d, J=7.5Hz)

(38) 8-[2,6-Dimethyl-3-[N-methyl-N-[(E)-3-[6-[(E)-2-(pyridin-4-yl)vinyl]pyridin-3-yl]acryloylglycyl]amino]benzyloxy]-2-methylquinoline

15 NMR (CDCl₃, δ) : 2.36 (3H, s), 2.53 (3H, s), 2.73 (3H, s), 3.27 (3H, s), 3.66 (1H, dd, J=4, 18Hz), 3.90 (1H, dd, J=4, 18Hz), 5.37 (2H, s), 6.56 (1H, d, J=16Hz), 6.75 (1H, t-like), 7.09 (1H, d, J=8Hz), 7.19 (1H, d, J=8Hz), 7.22-7.33 (2H, m), 7.33-7.48 (6H, m), 7.53-7.67 (2H, m), 7.81 (1H, d, J=8Hz), 8.04 (1H, d, J=8Hz), 8.62 (2H, d, J=5Hz), 8.74 (1H, s-like)

25 its trihydrochloride

30 NMR (DMSO-d₆, δ) : 2.30 (3H, s), 2.47 (3H, s), 2.84 (3H, s), 3.12 (3H, s), 3.55 (1H, dd, J=4, 16Hz), 3.74 (1H, dd, J=4, 16Hz), 5.44 (2H, s), 7.01 (1H, d, J=16Hz), 7.30 (1H, d, J=8Hz), 7.38 (1H, d, J=8Hz), 7.47 (1H, d, J=16Hz), 7.70-7.95 (6H, m), 8.02 (1H, d, J=8Hz), 8.11 (1H, dd, J=2, 8Hz), 8.23-8.29 (2H, m), 8.35 (1H, t-like), 8.76-8.91 (4H, m)

35 (39) 8-[3-[N-[(E)-3-(6-Aminopyridin-3-yl)acryloylglycyl]-N-methylamino]-2,6-dimethylbenzyloxy]-2-methylquinoline

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5 NMR (CDCl₃, δ) : 2.36 (3H, s), 2.53 (3H, s), 2.73 (3H, s), 3.26 (3H, s), 3.62 (1H, dd, J=4, 18Hz), 3.87 (1H, dd, J=4, 18Hz), 4.68 (2H, br s), 5.35 (2H, s), 6.30 (1H, d, J=16Hz), 6.49 (1H, d, J=8Hz), 6.60 (1H, t-like), 7.06 (1H, d, J=8Hz), 7.17 (1H, d, J=8Hz), 7.22-7.33 (2H, m), 7.40-7.50 (3H, m), 7.60 (1H, dd, J=2, 8Hz), 8.03 (1H, d, J=8Hz), 8.17 (1H, d, J=2Hz)

10 (40) 8-[2,6-Dimethyl-3-[N-[(E)-3-(6-ethoxycarbonylpyridin-3-yl)acryloyl]glycyl]-N-methylamino]benzyloxy]-2-methylquinoline

15 NMR (CDCl₃, δ) : 1.45 (3H, t, J=7.5Hz), 2.38 (3H, s), 2.53 (3H, s), 2.72 (3H, s), 3.26 (3H, s), 3.64 (1H, dd, J=4, 18Hz), 3.90 (1H, dd, J=4, 18Hz), 4.49 (2H, q, J=7.5Hz), 5.36 (2H, s), 6.64 (1H, d, J=16Hz), 6.78 (1H, t-like), 7.08 (1H, d, J=8Hz), 7.18 (1H, d, J=8Hz), 7.23-7.33 (2H, m), 7.39-7.49 (2H, m), 7.61 (1H, d, J=16Hz), 7.92 (1H, dd, J=2, 8Hz), 8.03 (1H, d, J=8Hz), 8.13 (1H, d, J=8Hz), 8.84 (1H, d, J=2Hz)

25 (41) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(4-pyridylcarbamoyl)-cinnamoyl]glycyl]amino]benzyloxy]-2-methyl-4-piperidinoquinoline

30 NMR (CDCl₃, δ) : 1.65-1.76 (2H, m), 1.79-1.90 (4H, m), 2.54 (3H, br s), 3.18 (3H, s), 3.20-3.30 (4H, m), 3.64 (1H, br dd, J=17, 4Hz), 3.91 (1H, br d, J=17Hz), 5.52 (2H, s), 6.51 (1H, d, J=15Hz), 6.71 (1H, s), 7.21-7.45 (7H, m), 7.64 (1H, br d, J=8Hz), 7.75 (2H, br d, J=7Hz), 7.90 (2H, d, J=8Hz), 8.45 (2H, d, J=7Hz), 9.59 (1H, br s)

its trihydrochloride

35 NMR (CDCl₃-CD₃OD, δ) : 1.78-2.04 (6H, m), 2.78 (3H, br

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s), 3.29 (3H, s), 3.62-4.00 (5H, m), 4.21 (1H, br s), 5.49 (1H, d, J=10Hz), 5.66 (1H, d, J=10Hz), 6.60 (1H, br s), 6.87 (1H, br s), 7.22-7.70 (8H, m), 8.06-8.20 (2H, m), 8.41-8.55 (2H, m), 8.60-8.77 (2H, m)

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(42) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(4-pyridylcarbamoyl)-cinnamoyl]glycyl]amino]benzyloxy]-2-methyl-4-morpholinoquinoline

10 NMR (CDCl₃, δ) : 2.55 (3H, s), 3.17-3.24 (7H, m), 3.62 (1H, dd, J=17, 4Hz), 3.85 (1H, dd, J=17, 5Hz), 3.95-4.01 (4H, m), 5.57 (2H, s), 6.50 (1H, d, J=15Hz), 6.70-6.76 (2H, m), 7.20-7.28 (2H, m), 7.33-7.56 (5H, m), 7.61-7.71 (3H, m), 7.89 (2H, d, J=8Hz), 8.49 (2H, d, J=7Hz), 8.99 (1H, br s)

15

its trihydrochloride

20 NMR (CDCl₃-CD₃OD, δ) : 2.87 (3H, br s), 3.29 (3H, s), 3.68-4.25 (10H, m), 5.50 (1H, br d, J=10Hz), 5.69 (1H, br d, J=10Hz), 6.61 (1H, br s), 7.07 (1H, br s), 7.28-7.74 (8H, m), 8.01-8.16 (2H, m), 8.45-8.70 (4H, m)

Example 69

25 The following compounds were obtained according to a similar manner to that of Example 3.

(1) 8-[3-[N-[(E)-3-(6-Carboxypyridin-3-yl)acryloyl]glycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-4-dimethylamino-2-methylquinoline

30

NMR (DMSO-d₆, δ) : 2.60 (3H, s), 3.13 (3H, s), 3.20-3.42 (6H, overlapped with H₂O), 3.58 (1H, br dd, J=17, 4Hz), 3.90 (1H, br dd, J=17, 5Hz), 5.51 (1H, d, J=10Hz), 5.58 (1H, d, J=10Hz), 6.90 (1H, br s), 7.01 (1H, d, J=15Hz), 7.44-7.93 (6H, m), 8.07

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(1H, d, J=8Hz), 8.14 (1H, br d, J=8Hz), 8.45 (1H, br t, J=5Hz), 8.88 (1H, br s)

- 5 (2) 8-[3-[N-[(E)-3-(6-Carboxypyridin-3-yl)acryloylglycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methyl-4-piperidinoquinoline

NMR (DMSO-d₆, δ) : 1.59-1.83 (6H, m), 2.55 (3H, br s),
3.00-3.60 (8H, overlapped with H₂O), 3.86 (1H, br
d, J=17, 4Hz), 5.50 (2H, br s), 6.87-7.08 (2H, m),
10 7.30-7.67 (4H, m), 7.79 (2H, s), 8.03-8.51 (4H, m),
8.59 (0.5H, br s), 8.89 (0.5H, br s)

- 15 (3) 8-[3-[N-[(E)-3-(6-Carboxypyridin-3-yl)acryloylglycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methyl-4-morpholinoquinoline

NMR (CDCl₃-CD₃OD, δ) : 2.67 (3H, br s), 3.25 (3H, s),
3.30-3.45 (4H, m), 3.77 (1H, br d, J=17Hz), 3.92-
4.11 (5H, m), 5.45-5.62 (2H, m), 6.64-7.00 (2H, m),
7.24-7.68 (6H, m), 7.90 (1H, br d, J=8Hz), 8.04
20 (1H, br s), 8.70 (1H, br s)

- (4) 8-[3-[N-[(E)-3-(6-Carboxypyridin-3-yl)acryloylglycyl]-N-methylamino]-2,6-dimethylbenzyloxy]-2-methylquinoline

NMR (DMSO-d₆, δ) : 2.33 (3H, s), 2.46 (3H, s), 2.61
25 (3H, s), 3.13 (3H, s), 3.51 (1H, dd, J=5, 16Hz),
3.71 (1H, dd, J=5, 16Hz), 5.25-5.37 (2H, m), 7.00
(1H, d, J=16Hz), 7.25 (1H, d, J=8Hz), 7.37 (1H, d,
J=8Hz), 7.37-7.57 (5H, m), 8.00 (1H, d, J=8Hz),
8.08 (1H, d, J=8Hz), 8.21 (1H, d, J=8Hz), 8.33 (1H,
30 t-like), 8.78 (1H, s-like)

Example 70

The following compounds were obtained according to a similar manner to that of Example 7.

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(1) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-(methylcarbamoyl)pyridin-3-yl]acryloylglycyl]amino]-benzyloxy]-2-methyl-4-dimethylaminoquinoline

5 NMR (CDCl₃, δ) : 2.62 (3H, s), 2.98 (6H, s), 3.04 (3H, d, J=7Hz), 3.26 (3H, s), 3.74 (1H, dd, J=7, 15Hz), 3.95 (1H, dd, J=7, 15Hz), 5.58 (2H, m), 6.59-6.68 (2H, m), 6.94 (1H, br), 7.19 (1H, d, J=8Hz), 7.28-7.36 (2H, m), 7.48 (1H, d, J=8Hz), 7.58 (1H, d, J=15Hz), 7.70 (1H, d, J=8Hz), 7.84-8.01 (2H, m), 10 8.08 (1H, d, J=10Hz), 8.56 (1H, s)

its trihydrochloride

15 NMR (CDCl₃-CD₃OD, δ) : 2.74 (3H, s), 3.07 (3H, s), 3.28 (3H, br), 3.51 (6H, s), 3.87 (1H, d, J=15Hz), 4.30 (1H, d, J=15Hz), 5.45 (1H, d, J=8Hz), 5.65 (1H, d, J=8Hz), 6.77 (1H, br), 6.98 (1H, d, J=15Hz), 7.37-7.47 (2H, m), 7.51-7.64 (3H, m), 7.81 (1H, d, J=8Hz), 8.49 (1H, br), 8.64 (1H, br), 9.23 (1H, br)

20

(2) 8-[2,6-Dichloro-3-[N-[(E)-3-[6-(dimethylcarbamoyl)-pyridin-3-yl]acryloylglycyl]-N-methylamino]benzyloxy]-4-dimethylamino-2-methylquinoline

25 NMR (CDCl₃, δ) : 2.66 (3H, br s), 3.03 (6H, br s), 3.13 (3H, s), 3.26 (3H, s), 3.75 (1H, br d, J=18Hz), 3.98 (1H, br d, J=18Hz), 5.54-5.65 (2H, m), 6.58-6.71 (2H, m), 7.15-7.41 (4H, m), 7.48 (1H, d, J=8Hz), 7.51-7.64 (2H, m), 7.70 (1H, d, J=8Hz), 7.89 (1H, dd, J=2, 8Hz), 8.64 (1H, s)

30

its trihydrochloride

35 NMR (DMSO-d₆, δ) : 2.63 (3H, s), 2.95 (3H, s), 3.01 (3H, s), 3.14 (3H, s), 3.42 (6H, s), 3.59 (1H, dd, J=4, 16Hz), 3.92 (1H, dd, J=4, 16Hz), 5.53 (1H, d, J=10Hz), 5.60 (1H, d, J=10Hz), 6.90-7.00 (2H, m),

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7.45 (1H, d, J=16Hz), 7.53-7.65 (2H, m), 7.72-7.89 (3H, m), 7.95 (1H, d, J=8Hz), 8.09 (1H, d, J=8Hz), 8.43 (1H, t-like), 8.75 (1H, s)

5 (3) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-(2-pyridylmethylcarbamoyl)pyridin-3-yl]acryloylglycyl]-amino]benzyloxy]-4-dimethylamino-2-methylquinoline
 10 NMR (CDCl₃, δ) : 2.65 (3H, br s), 3.00 (6H, br s), 3.26 (3H, s), 3.73 (1H, br d, J=17Hz), 3.97 (1H, br d, J=17Hz), 4.79 (2H, d, J=5Hz), 5.60 (2H, br s), 6.67 (1H, br s), 6.85 (1H, broad), 7.17-7.36 (5H, m), 7.46 (1H, d, J=8Hz), 7.59 (1H, d, J=15Hz), 7.62-7.72 (3H, m), 7.90 (1H, br d, J=8Hz), 8.15 (1H, m), 8.57-8.65 (2H, m), 8.88 (1H, m)

15 its tetrahydrochloride

NMR (CDCl₃-CD₃OD, δ) : 2.62-2.88 (3H, overlapped with H₂O), 3.27 (3H, s), 3.50 (6H, s), 3.87 (1H, d, J=17Hz), 4.25 (1H, d, J=17Hz), 5.12 (2H, br s), 20 5.46 (1H, d, J=10Hz), 5.62 (1H, d, J=10Hz), 6.74 (1H, br s), 6.95 (1H, br d, J=15Hz), 7.37-7.65 (5H, m), 7.81 (1H, br d, J=8Hz), 7.89 (1H, br t, J=7Hz), 8.11 (1H, br d, J=8Hz), 8.27 (1H, m), 8.34 (1H, m), 8.44 (1H, br t, J=8Hz), 8.78 (1H, br d, J=5Hz), 25 8.92 (1H, m)

(4) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-[N-(4-pyridyl)carbamoyl]pyridin-3-yl]acryloylglycyl]amino]-benzyloxy]-2-methyl-4-dimethylaminoquinoline
 30 NMR (CDCl₃, δ) : 2.63 (3H, s), 3.00 (6H, s), 3.28 (3H, s), 3.79 (1H, dd, J=7, 15Hz), 3.99 (1H, dd, J=7, 15Hz), 5.60 (2H, m), 6.68 (1H, s), 6.73 (1H, d, J=15Hz), 7.19-7.28 (3H, m), 7.31-7.42 (2H, m), 7.48 (1H, d, J=8Hz), 7.62 (1H, d, J=15Hz), 7.66-7.75 (3H, m), 7.95 (1H, dd, J=4, 8Hz), 8.17 (1H, d, 35

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J=8Hz), 8.57 (2H, d, J=8Hz), 8.62 (1H, s)

its tetrahydrochloride

5 NMR (CD₃OD, δ) : 2.68 (3H, s), 3.28 (3H, s), 3.49 (6H, s), 3.82 (1H, d, J=15Hz), 4.02 (1H, d, J=15Hz), 5.65 (1H, d, J=8Hz), 5.71 (1H, d, J=8Hz), 6.87 (1H, s), 6.97 (1H, d, J=15Hz), 7.54-7.71 (6H, m), 7.97 (1H, d, J=8Hz), 8.28 (2H, m), 8.53 (2H, d, J=8Hz), 8.70 (2H, d, J=8Hz), 8.91 (1H, s)

10 (5) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-(2-pyridylmethylcarbamoyl)pyridin-3-yl]acryloyl]glycyl]-amino]benzyloxy]-2-methyl-4-piperidinoquinoline

15 NMR (CDCl₃, δ) : 1.59-1.74 (2H, overlapped with H₂O), 1.79-1.89 (4H, m), 2.63 (3H, br s), 3.09-3.20 (4H, m), 3.26 (3H, s), 3.73 (1H, br d, J=17Hz), 3.95 (1H, br d, J=17Hz), 4.79 (2H, d, J=5Hz), 5.60 (2H, s), 6.63 (1H, br d, J=15Hz), 6.72 (1H, br s), 6.85 (1H, br s), 7.17-7.39 (5H, m), 7.48 (1H, d, J=8Hz), 7.56-7.71 (3H, m), 7.91 (1H, br d, J=8Hz), 8.16 (1H, br d, J=8Hz), 8.61 (1H, d, J=5Hz), 8.65 (1H, br s), 8.89 (1H, br t, J=5Hz)

20 its tetrahydrochloride

25 NMR (CDCl₃-CD₃OD, δ) : 1.81-1.98 (6H, m), 2.80 (3H, br s), 3.27 (3H, s), 3.69-3.79 (4H, m), 3.89 (1H, br d, J=17Hz), 4.40 (1H, br d, J=17Hz), 5.16 (2H, br s), 5.48 (1H, br d, J=10Hz), 5.63 (1H, br d, J=10Hz), 6.89 (1H, br s), 7.04 (1H, br d, J=15Hz), 7.33-7.70 (6H, m), 7.89 (1H, br s), 8.15 (1H, br s), 8.39-8.50 (2H, m), 8.53 (1H, br s), 8.79 (1H, br s), 9.04 (1H, br s)

30 (6) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-(2-pyridylmethylcarbamoyl)pyridin-3-yl]acryloyl]glycyl]-

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amino]benzyloxy]-2-methyl-4-morpholinoquinoline
and
its tetrahydrochloride

- 5 (7) 8-[2,6-Dimethyl-3-[N-methyl-N-[(E)-3-[6-(methylcarbamoyl)pyridin-3-yl]acryloylglycyl]-amino]benzyloxy]-2-methylquinoline

10 NMR (CDCl₃, δ) : 2.37 (3H, s), 2.53 (3H, s), 2.74 (3H, s), 3.05 (3H, d, J=5Hz), 3.27 (3H, s), 3.64 (1H, dd, J=4, 16Hz), 3.90 (1H, dd, J=4, 16Hz), 5.36 (2H, s), 6.61 (1H, d, J=16Hz), 6.77 (1H, t-like), 7.07 (1H, d, J=8Hz), 7.18 (1H, d, J=8Hz), 7.22-7.33 (2H, m), 7.40-7.49 (2H, m), 7.60 (1H, d, J=16Hz), 7.90-8.00 (2H, m), 8.03 (1H, d, J=8Hz), 8.20 (1H, d, J=8Hz), 8.63 (1H, d, J=2Hz)

15 its dihydrochloride

20 NMR (DMSO-d₆, δ) : 2.29 (3H, s), 2.48 (3H, s), 2.82 (3H, d, J=5Hz), 2.92 (3H, s), 3.13 (3H, s), 3.55 (1H, dd, J=4, 16Hz), 3.75 (1H, dd, J=4, 16Hz), 5.41-5.54 (2H, m), 7.05 (1H, d, J=16Hz), 7.31 (1H, d, J=8Hz), 7.39 (1H, d, J=8Hz), 7.49 (1H, d, J=16Hz), 7.81-8.00 (4H, m), 8.05 (1H, d, J=8Hz), 8.15 (1H, dd, J=2, 8Hz), 8.35 (1H, t-like), 8.74-8.84 (2H, m), 8.98 (1H, br peak)

- 25 (8) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-(methylcarbamoyl)pyridin-3-yl]acryloylglycyl]amino]-benzyloxy]-2-methyl-4-piperidinoquinoline

30 NMR (CDCl₃, δ) : 1.69 (2H, br s), 1.84 (4H, br s), 2.63 (3H, s), 3.05 (3H, d, J=5Hz), 3.18 (4H, br s), 3.26 (3H, s), 3.72 (1H, dd, J=17, 4Hz), 3.96 (1H, dd, J=17, 4Hz), 5.59 (2H, s), 6.65 (1H, d, J=16Hz), 6.72 (1H, s), 7.00-7.70 (7H), 7.83-8.21 (3H), 8.58 (1H, s)

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its trihydrochloride

NMR (CD₃OD, δ) : 1.87 (6H, br s), 2.71 (3H, s), 2.98 (3H, s), 3.27 (3H, s), 3.78 (4H, br s), 3.82 (1H, d, J=17Hz), 4.02 (1H, d, J=17Hz), 5.64 (1H, d, J=11Hz), 5.72 (1H, d, J=11Hz), 6.82-8.30 (10H), 8.79 (1H, br s)

(9) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-(methylcarbamoyl)pyridin-3-yl]acryloylglycyl]amino]-benzyloxy]-2-methyl-4-morpholinoquinoline

NMR (CDCl₃, δ) : 2.67 (3H, s), 3.04 (3H, d, J=5Hz), 3.18-3.24 (4H, m), 3.28 (3H, s), 3.70 (1H, br dd, J=17, 4Hz), 3.90-4.01 (5H, m), 5.60 (1H, d, J=10Hz), 5.67 (1H, d, J=10Hz), 6.62 (1H, br d, J=15Hz), 6.78 (2H, s), 7.22 (1H, br d, J=8Hz), 7.30 (1H, d, J=8Hz), 7.38 (1H, t, J=8Hz), 7.49 (1H, d, J=8Hz), 7.60 (1H, d, J=15Hz), 7.67 (1H, br d, J=8Hz), 7.90-8.00 (2H, m), 8.18 (1H, d, J=8Hz), 8.61 (1H, br s)

its trihydrochloride

NMR (CDCl₃-CD₃OD, δ) : 2.86 (3H, br s), 3.07 (3H, s), 3.29 (3H, s), 3.73-3.90 (5H, m), 3.98-4.06 (4H, m), 4.48 (1H, br d, J=17Hz), 5.44 (1H, d, J=10Hz), 5.63 (1H, d, J=10Hz), 6.99-7.09 (2H, m), 7.30-7.69 (6H, m), 8.68-8.80 (2H, m), 9.44 (1H, br s)

Example 71

The following compounds were obtained according to a similar manner to that of Example 5.

(1) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-(4-pyridylacetamido)pyridin-3-yl]acryloylglycyl]amino]-benzyloxy]-4-dimethylamino-2-methylquinoline

NMR (CDCl₃, δ) : 2.66 (3H, s), 3.02 (6H, s), 3.26 (3H,

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5 s), 3.63-3.79 (3H, m), 3.96 (1H, br d, J=18Hz),
6.55-6.67 (2H, m), 6.49 (1H, d, J=16Hz), 6.68 (1H,
s), 7.16-7.40 (6H, m), 7.40-7.55 (2H, m), 7.71 (1H,
d, J=8Hz), 7.82 (1H, d, J=8Hz), 8.10-8.21 (2H, m),
8.32 (1H, s-like), 8.62 (2H, d, J=6Hz)

10 (2) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-(2-
methylnicotinamido)pyridin-3-yl]acryloylglycyl]amino]-
benzyloxy]-4-dimethylamino-2-methylquinoline
NMR (CDCl₃, δ) : 2.64 (3H, s), 2.77 (3H, s), 2.99 (6H,
s), 3.27 (3H, s), 3.64-3.77 (1H, m), 3.94 (1H, dd,
J=4, 18Hz), 5.56-5.67 (2H, m), 6.51 (1H, d,
J=16Hz), 6.69 (1H, s), 6.76 (1H, br peak), 7.15-
15 7.38 (4H, m), 7.45-7.48 (2H, m), 7.66-7.74 (1H, m),
7.83 (1H, d, J=8Hz), 7.80 (1H, d, J=8Hz), 8.30-8.40
(3H, m), 8.64 (1H, d, J=6Hz)

20 (3) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-
(isonicotinamido)pyridin-3-yl]acryloylglycyl]amino]-
benzyloxy]-4-dimethylamino-2-methylquinoline
NMR (CDCl₃, δ) : 2.66 (3H, s), 3.04 (6H, s), 3.27 (3H,
s), 3.76 (1H, br d, J=18Hz), 3.98 (1H, br d,
J=18Hz), 5.60 (2H, s), 6.65 (1H, d, J=16Hz), 6.69
(1H, s), 7.17-7.42 (4H, m), 7.48 (1H, d, J=8Hz),
25 7.54 (1H, d, J=16Hz), 7.71 (1H, d, J=8Hz), 7.78
(2H, d, J=6Hz), 7.90 (1H, dd, J=2, 8Hz), 8.33 (1H,
d, J=8Hz), 8.41 (1H, d, J=2Hz), 8.76 (1H, s), 8.84
(2H, d, J=6Hz)

30 (4) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-(4-
pyridylacetamido)pyridin-3-yl]acryloylglycyl]amino]-
benzyloxy]-2-methyl-4-piperidinoquinoline
NMR (CDCl₃, δ) : 2.61-2.90 (6H, m), 2.68 (3H, br s),
3.20 (4H, br peak), 3.25 (3H, s), 3.65-3.80 (3H,
35 m), 3.98 (1H, br d, J=18Hz), 5.59 (2H, s), 6.52

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(1H, d, J=16Hz), 6.72 (1H, s), 7.21 (1H, d, J=8Hz),
 7.25-7.41 (5H, m), 7.45 (1H, d, J=8Hz), 7.49 (1H,
 d, J=16Hz), 7.63 (1H, d, J=8Hz), 7.81 (1H, dd, J=2,
 8Hz), 8.08-8.19 (1H, m), 8.23-8.33 (2H, m), 8.61
 (2H, d, J=6Hz)

(5) 8-[2,6-Dichloro-3-[N-methyl-N-[(E)-3-[6-(4-
 pyridylacetamido)pyridin-3-yl]acryloylglycyl]amino]-
 benzyloxy]-2-methyl-4-morpholinoquinoline
 NMR (CDCl₃, δ) : 2.67 (3H, s), 3.22 (4H, br), 3.27
 (3H, s), 3.66-3.76 (4H, m), 3.98 (4H, m), 5.68 (2H,
 m), 6.47 (1H, d, J=15Hz), 6.78 (1H, s), 6.94 (1H,
 br), 7.22 (1H, d, J=8Hz), 7.28-7.50 (6H, m), 7.66
 (1H, d, J=8Hz), 7.79 (1H, dd, J=4, 8Hz), 8.16 (1H,
 d, J=8Hz), 8.30 (1H, br), 8.60 (2H, d, J=7Hz), 8.68
 (1H, s)

Example 72

The following compounds were obtained according to a
 similar manner to that of Example 19.

(1) 8-[2,6-Dichloro-3-[N-methyl-N-[N'-[3-[N-(4-pyridyl)-
 carbamoyl]phenyl]ureidoacetyl]amino]benzyloxy]-2-methyl-
 4-dimethylaminoquinoline
 NMR (CDCl₃, δ) : 2.50 (3H, s), 3.01 (6H, s), 3.19 (3H,
 s), 3.92 (2H, m), 5.40 (2H, m), 6.32 (1H, br), 6.65
 (1H, s), 7.03 (1H, m), 7.14 (2H, m), 7.28-7.42 (4H,
 m), 7.64 (1H, m), 7.70 (1H, d, J=8Hz), 7.78 (2H,
 m), 8.40-8.52 (2H, m), 8.69 (1H, br), 9.47 (1H, br)

its trihydrochloride

NMR (CD₃OD, δ) : 2.41 (3H, s), 3.07 (3H, s), 3.27 (6H,
 s), 3.42-3.70 (2H, m), 5.40 (1H, d, J=15Hz), 5.52
 (1H, d, J=15Hz), 6.62 (1H, s), 7.18-7.48 (9H, m),
 7.72 (1H, d, J=8Hz), 7.86 (1H, m), 8.10-8.20 (3H,

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m), 8.44 (2H, m)

- (2) 8-[2,6-Dichloro-3-[N-methyl-N-[N'-(3-nitrophenyl)-ureidoacetyl]amino]benzyloxy]-4-dimethylamino-2-methylquinoline

5
10
NMR (CDCl₃, δ) : 2.44 (3H, s), 3.06 (6H, s), 3.23 (3H, s), 3.77 (1H, dd, J=3, 18Hz), 4.70 (1H, dd, J=10, 18Hz), 5.32 (1H, d, J=10Hz), 5.44-5.53 (1H, m), 5.56 (1H, d, J=10Hz), 7.68 (1H, s), 7.10-7.21 (2H, m), 7.21-7.29 (1H, m), 7.29-7.48 (3H, m), 7.63-7.74 (2H, m), 8.20 (1H, s), 9.90 (1H, s)

- (3) 8-[2,6-Dichloro-3-[N-methyl-N-[N'-(3-[(E)-2-(pyridin-4-yl)vinyl]phenyl]ureidoacetyl]amino]benzyloxy]-2-methyl-4-dimethylaminoquinoline

15
20
NMR (CDCl₃, δ) : 2.48 (3H, s), 3.04 (6H, s), 3.22 (3H, s), 3.65-3.87 (2H, m), 5.41 (1H, d, J=8Hz), 5.61 (1H, d, J=8Hz), 5.63 (1H, br), 6.68-6.80 (2H, m), 7.00-7.22 (7H, m), 7.29-7.36 (2H, m), 7.45 (1H, t, J=8Hz), 7.57 (1H, s), 7.70 (1H, d, J=8Hz), 8.52 (2H, d, J=7Hz), 8.86 (1H, br)

its trihydrochloride

25
30
NMR (CD₃OD, δ) : 2.57 (3H, s), 3.27 (3H, s), 3.46 (6H, s), 3.70 (1H, d, J=15Hz), 3.90 (1H, d, J=15Hz), 5.63 (1H, d, J=8Hz), 5.76 (1H, d, J=8Hz), 6.75 (1H, m), 6.80 (1H, s), 7.15 (1H, m), 7.30-7.45 (4H, m), 7.58 (1H, m), 7.66-7.99 (6H, m), 8.12 (2H, d, J=8Hz), 8.68 (2H, d, J=8Hz)

- (4) 8-[2,6-Dichloro-3-[N-methyl-N-[N'-(3-[N-(4-pyridyl)-carbamoyl]phenyl]ureidoacetyl]amino]benzyloxy]-2-methyl-4-piperidinoquinoline

35
NMR (CDCl₃, δ) : 1.65-1.90 (6H, m), 2.54 (3H, s), 3.11-3.29 (7H, m), 4.00 (2H, br s), 5.49 (2H, br

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s), 6.32 (1H, br s), 6.70 (1H, br s), 7.06 (1H, t, J=8Hz), 7.19 (2H, br d, J=8Hz), 7.23-7.48 (5H, m), 7.63 (1H, br d, J=8Hz), 7.75 (2H, br d, J=6Hz), 8.49 (2H, br d, J=6Hz), 8.88 (1H, br s), 9.35 (1H, br s)

5

its trihydrochloride

NMR (CDCl₃-CD₃OD, δ) : 1.81-1.94 (6H, m), 2.57 (3H, br s), 3.24 (3H, s), 3.67-3.77 (4H, m), 3.82 (1H, br d, J=17Hz), 4.19 (1H, br d, J=17Hz), 5.48 (1H, d, J=10Hz), 5.67 (1H, d, J=10Hz), 6.73 (1H, br s), 7.18 (1H, br t, J=8Hz), 7.39-7.65 (7H, m), 7.92 (1H, br s), 8.45-8.54 (4H, m)

10

- 15 (5) 8-[2,6-Dichloro-3-[N-methyl-N-[N'-[3-[N-(4-pyridyl)-carbamoyl]phenyl]ureidoacetyl]amino]benzyloxy]-2-methyl-4-morpholinoquinoline

NMR (CDCl₃, δ) : 2.59 (3H, s), 3.17-3.26 (7H, m), 3.91-4.01 (4H, m), 5.41 (1H, d, J=10Hz), 5.49 (1H, d, J=10Hz), 6.45 (1H, br s), 6.76 (1H, s), 7.00-7.10 (2H, m), 7.19 (1H, br d, J=8Hz), 7.22-7.48 (5H, m), 7.68 (1H, br d, J=8Hz), 7.82 (2H, br d, J=7Hz), 8.51 (2H, br d, J=7Hz), 8.58 (1H, br s), 9.51 (1H, br s)

20

25

its trihydrochloride

NMR (CDCl₃-CD₃OD, δ) : 2.66 (3H, s), 3.25 (3H, s), 3.68-4.07 (9H, m), 4.19 (1H, br s), 5.49 (1H, d, J=7.5Hz), 5.69 (1H, d, J=7.5Hz), 6.92 (1H, br s), 7.16 (1H, br s), 7.41-7.70 (7H, m), 7.91 (1H, br s), 8.40-8.59 (4H, m)

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- (6) 8-[2,6-Dichloro-3-[N-methyl-N-[N'-[4-[N-(4-pyridylmethyl)carbamoyl]phenyl]ureidoacetyl]amino]benzyloxy]-2-methylquinoline

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5 NMR (CDCl₃, δ) : 2.56 (3H, s), 3.17 (3H, br), 3.49-3.82 (2H, m), 4.54 (2H, br), 5.47 (1H, d, J=8Hz), 5.57 (1H, m), 7.15 (2H, br), 7.23-7.33 (5H, m), 7.46 (2H, br), 7.60 (2H, d, J=8Hz), 8.08 (1H, m), 8.46 (2H, br), 8.93 (1H, br)

its dihydrochloride

10 NMR (CD₃OD, δ) : 3.00 (3H, s), 3.28 (3H, s), 3.80 (2H, m), 4.84 (2H, br), 5.70 (1H, d, J=8Hz), 5.84 (1H, d, J=8Hz), 7.49 (2H, d, J=8Hz), 7.73 (2H, d, J=4Hz), 7.84 (2H, m), 7.91 (4H, m), 8.04 (2H, d, J=8Hz), 8.78 (2H, d, J=8Hz), 9.03 (1H, m)

15 (7) 8-[2,6-Dichloro-3-[N-[N'-[3-(methanesulfonylamino-carbonyl)phenyl]ureidoacetyl]-N-methylamino]benzyloxy]-2-methylquinoline

mp : 239-242°C

20 NMR (CDCl₃-CD₃OD, δ) : 2.64 (3H, s), 3.22 (3H, s), 3.28 (3H, s), 3.79 (1H, br d, J=17Hz), 3.90 (1H, br d, J=17Hz), 5.52 (1H, d, J=10Hz), 5.60 (1H, d, J=10Hz), 7.13-7.19 (2H, m), 7.22-7.60 (7H, m), 7.81 (1H, br s), 8.09 (1H, d, J=8Hz)

25 (8) 8-[2,6-Dichloro-3-[N-[N'-[3-(4-methylbenzenesulfonylamino-carbonyl)phenyl]ureidoacetyl]-N-methylamino]benzyloxy]-2-methylquinoline

mp : 235-240°C

30 NMR (CDCl₃-CD₃OD, δ) : 2.37 (3H, s), 2.61 (3H, s), 3.21 (3H, s), 3.80 (1H, br d, J=17Hz), 3.90 (1H, br d, J=17Hz), 5.51 (1H, d, J=10Hz), 5.69 (1H, d, J=10Hz), 6.99-7.13 (2H, m), 7.18-7.49 (9H, m), 7.70 (1H, br s), 7.97 (2H, d, J=8Hz), 8.05 (1H, d, J=8Hz)

35 (9) 8-[2,6-Dichloro-3-[N-methyl-N-[N'-[3-[(E)-2-(pyridin-4-

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yl)vinyl]phenyl]ureidoacetyl]amino]benzyloxy]-2-methylquinoline

NMR (CDCl₃, δ) : 2.62 (3H, s), 3.22 (3H, s), 3.63-3.88 (2H, m), 5.49 (1H, d, J=8Hz), 5.63 (1H, d, J=8Hz), 5.67 (1H, br), 6.78-6.88 (2H, m), 7.03-7.25 (7H, m), 7.33 (2H, m), 7.48 (1H, m), 7.59 (1H, br), 8.02 (1H, br), 8.08 (1H, d, J=8Hz), 8.41 (1H, br), 8.51 (2H, d, J=7Hz)

10 its dihydrochloride

NMR (CD₃OD, δ) : 2.93 (3H, s), 3.28 (3H, s), 3.77 (1H, d, J=15Hz), 3.89 (1H, d, J=15Hz), 5.65 (1H, m), 5.72 (1H, d, J=8Hz), 5.84 (1H, d, J=8Hz), 7.29-7.40 (3H, m), 7.59-8.00 (9H, m), 8.13 (2H, d, J=8Hz), 8.69 (2H, d, J=8Hz), 9.00 (2H, m)

(10) 8-[2,6-Dichloro-3-[N-methyl-N-[N'-(3-[(2)-(pyridin-4-yl)vinyl]phenyl]ureidoacetyl]amino]benzyloxy]-2-methylquinoline

20 NMR (CDCl₃, δ) : 2.61 (3H, s), 3.17 (3H, s), 3.76 (1H, dd, J=4, 16Hz), 4.01 (1H, dd, J=5, 16Hz), 5.47 (1H, d, J=10Hz), 5.60 (1H, d, J=10Hz), 5.73 (1H, t-like), 6.35 (1H, d, J=11Hz), 6.64 (1H, d, J=11Hz), 6.74 (1H, d, J=8Hz), 6.94-7.19 (5H, m), 7.19-7.37 (4H, m), 7.37-7.51 (2H, m), 8.05 (1H, d, J=8Hz), 8.23-8.58 (3H, m)

(11) 8-[2,6-Dichloro-3-[N-methyl-N-[N'-(3-[2-(pyridin-4-yl)ethyl]phenyl]ureidoacetyl]amino]benzyloxy]-2-methylquinoline

30 NMR (CDCl₃, δ) : 2.61 (3H, s), 2.66-2.80 (4H, m), 3.22 (3H, s), 3.80 (1H, dd, J=4, 17Hz), 4.23 (1H, dd, J=5, 17Hz), 5.47 (1H, d, J=10Hz), 5.53 (1H, t-like), 5.63 (1H, d, J=10Hz), 6.71 (1H, d, J=8Hz), 6.90-7.13 (4H, m), 7.19 (1H, s-like), 7.21-7.35

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(4H, m), 7.42-7.50 (2H, m), 8.02 (1H, s-like), 8.08 (1H, d, J=8Hz), 8.43 (2H, d, J=6Hz)

its dihydrochloride

5 NMR (DMSO-d₆, δ) : 2.82-2.97 (5H, m), 3.06-3.21 (5H, m), 3.40-3.90 (2H, m, (overlap in H₂O)), 5.61 (2H, s), 6.48 (1H, br s), 6.77 (1H, d, J=8Hz), 7.11 (1H, t, J=8Hz), 7.16-7.31 (2H, m), 7.67-7.88 (6H, m), 7.93 (2H, d, J=6Hz), 8.75-8.89 (3H, m), 8.96 (1H, s)

10

Example 73

(1) 8-[N-tert-Butoxycarbonyl-N-[2,6-dichloro-3-[N-methyl-N-(phthalimidoacetyl)amino]benzyl]amino]-2-methylquinoline was obtained from 8-tert-butoxycarbonylamino-2-methylquinoline and 2,6-dichloro-3-[N-methyl-N-(phthalimidoacetyl)amino]-benzyl bromide according to a similar manner to that of Preparation 6.

15

20 NMR (CDCl₃-CD₃OD, δ) : 1.24, 1.66 (9H, s), 2.72, 2.78 (3H, s), 2.96, 3.04 (3H, s), 3.16-3.22, 3.56-3.66 (2H, m), 5.18-5.38, 5.50-5.69 (2H, m), 6.83-8.08 (11H, m)

(2) 8-[N-[3-(N-Glycyl-N-methylamino)-2,6-dichlorobenzyl]-N-tert-butoxycarbonylamino]-2-methylquinoline was obtained according to a similar manner to that of Preparation 11.

25

30 NMR (CDCl₃, δ) : 1.20, 1.63 (3H, s), 2.14-2.20, 2.59-2.88 (2H, m), 2.19, 2.23 (3H, s), 5.07-5.22, 5.54-5.70 (2H, m), 6.83-7.88, 7.66, 8.00 (7H, m)

(3) 8-[N-tert-Butoxycarbonyl-N-[2,6-dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)cinnamoylglycyl]amino]benzyl]amino]-2-methylquinoline was obtained according to a similar manner to that of Example 1.

35

NMR (CDCl₃, δ) : 1.24, 1.60 (9H, s), 2.74 (3H, s),

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3.05 (3H, s), 3.08 (3H, s), 2.84, 2.90, 3.80, 3.86
(2H, m), 5.00-5.16, 5.62-5.72 (2H, m), 6.16 (1H,
br), 6.48 (1H, m), 6.56 (1H, m), 6.60-6.98 (1H, m),
7.10 (1H, m), 7.46 (1H, m), 7.50-7.66 (4H, m), 7.75
(2H, m), 7.96 (1H, m)

(4) To a solution of 8-[N-tert-butoxycarbonyl-N-[2,6-
dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)cinnamoylglycyl]-
amino]benzyl]amino]-2-methylquinoline (32.3 mg) in ethyl
acetate (0.5 ml) was added 4N solution of hydrogen chloride
in ethyl acetate (0.5 ml) under ice-cooling, and the mixture
was stirred for 30 minutes at the same temperature and for 2
hours at ambient temperature. The mixture was concentrated
in vacuo to give 8-[2,6-dichloro-3-[N-methyl-N-[4-
(methylcarbamoyl)cinnamoylglycyl]amino]benzylamino]-2-
methylquinoline dihydrochloride (22.0 mg) as amorphous
powder.

NMR (CDCl₃, δ) : 3.00 (3H, s), 3.20 (3H, s), 3.31 (3H,
s), 3.84-4.06 (2H, m), 4.71-4.85 (2H, m), 6.25 (1H,
m), 6.55 (1H, m), 7.07 (1H, m), 7.16 (1H, d,
J=8Hz), 7.27-7.31 (2H, m), 7.42-7.58 (4H, m), 7.64-
7.74 (3H, m), 8.57 (1H, m)

Example 74

To a suspension of sodium hydride (60% in oil, 38 mg) in
anhydrous dimethylformamide (2.0 ml) was added 8-[2,6-
dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)cinnamoylglycyl]-
amino]benzyloxy]-2-methylquinoline (189 mg) under nitrogen
atmosphere in an ice-water bath. After stirring for 40
minutes, methyl iodide (0.06 ml) was added thereto and the
mixture was stirred for additional 2 hours. The reaction
mixture was partitioned between ethyl acetate and water and
organic layer was isolated. The aqueous layer was extracted
with ethyl acetate. The combined organic phases were washed
with water twice, dried over magnesium sulfate and evaporated

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in vacuo. The residue was pulverized with diethyl ether to give 8-[2,6-dichloro-3-[N-methyl-N-[N-methyl-N-[4-(dimethylcarbamoyl)cinnaoyl]glycyl]amino]benzyloxy]-2-methylquinoline (160 mg) as a pale yellow powder.

5 NMR (CDCl₃, δ) : 2.72 (3H, s), 2.98 (3H, br s), 3.11 (3H, br s), 3.23 (6H, s), 3.41 (1H, d, J=16Hz), 4.36 (1H, d, J=16Hz), 5.66 (2H, s), 6.97 (1H, d, J=15Hz), 7.14-7.59 (10H), 7.66 (1H, d, J=15Hz), 8.03 (1H, d, J=8Hz)

10

Example 75

(1) To a mixture of 8-(3-amino-2,6-dichlorobenzyloxy)-2-methylquinoline (1.67 g), triethylamine (0.9 ml) and anhydrous dichloromethane (84 ml) was added

15 3-methoxycarbonylpropionyl chloride (0.7 ml). After stirring at ambient temperature for 9 hours, triethylamine (1.8 ml) and 3-methoxycarbonylpropionyl chloride (1.4 ml) were added thereto and the mixture was stirred for additional 30 minutes. The reaction mixture was washed with water and
20 saturated aqueous solution of sodium hydrogen carbonate, dried over magnesium sulfate and evaporated in vacuo. The residue was purified by a silica gel column chromatography eluted with chloroform to give 8-[2,6-dichloro-3-(3-methoxycarbonylpropionylamino)benzyloxy]-2-methylquinoline
25 (2.04 g) as a pale yellow oil.

NMR (CDCl₃, δ) : 2.63-3.05 (4H), 2.74 (3H, s), 3.69 (3H, s), 5.68 (2H, s), 7.18-7.46 (6H), 8.03 (1H, d, J=8Hz), 8.27 (1H, br s)

30 (2) To a mixture of 8-[2,6-dichloro-3-(3-methoxycarbonylpropionylamino)benzyloxy]-2-methylquinoline (447 mg), iodomethane (0.1 ml) and dimethylformamide (5.0 ml) was added sodium hydride (60% in oil, 44 mg) under ice-water cooling. After stirring for 2 hours at the same temperature,
35 the reaction mixture was diluted with ethyl acetate and

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washed with water twice. The organic layer was dried over magnesium sulfate and evaporated in vacuo. The residue was purified by a column chromatography eluted with chloroform to give 8-[2,6-dichloro-3-[N-(3-methoxycarbonylpropionyl)-N-methylamino]benzyloxy]-2-methylquinoline (310 mg) as a pale yellow oil.

NMR (CDCl₃, δ) : 2.15 (1H, dt, J=16, 7Hz), 2.30-2.55 (2H), 2.65-2.78 (1H), 2.75 (3H, s), 3.19 (3H, s), 3.68 (3H, s), 5.67 (2H, s), 7.21-7.49 (6H), 8.03 (1H, d, J=8Hz)

(3) To a solution of 8-[2,6-dichloro-3-[N-(3-methoxycarbonylpropionyl)-N-methylamino]benzyloxy]-2-methylquinoline (303 mg) in methanol (3 ml) was added 1N aqueous solution of sodium hydroxide (1.0 ml) at ambient temperature. The mixture was stirred for 1 hour and neutralized to pH 4 with 1N hydrochloric acid. The reaction mixture was diluted with chloroform and washed with water. The aqueous layer was saturated with sodium chloride and extracted with chloroform. The combined organic layers were dried over magnesium sulfate and evaporated in vacuo to give 8-[3-[N-(3-carboxypropionyl)-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline (242 mg) as an off-white powder.

NMR (CDCl₃, δ) : 2.32 (1H, m), 2.53-2.69 (3H), 2.67 (3H, s), 3.23 (3H, s), 5.44 (1H, d, J=10Hz), 5.62 (1H, d, J=10Hz), 7.18-7.53 (6H), 8.08 (1H, d, J=8Hz)

(4) To a mixture of 8-[3-[N-(3-carboxypropionyl)-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline (139 mg), 3-amino-N-methylbenzamide (51.3 mg) and anhydrous dichloromethane (4 ml) were added 1-ethyl-3-(3-dimethylaminopropyl)carbodiimide hydrochloride (71.5 mg) and 1-hydroxybenzotriazole (54.6 mg). The mixture was stirred

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for 12 hours at ambient temperature and washed with water. The organic layer was dried over magnesium sulfate and evaporated in vacuo. The residue was purified by preparative thin-layer chromatography (chloroform-methanol) followed by pulverization with diethyl ether to give 8-[2,6-dichloro-3-N-[3-[N-(3-methylcarbamoylphenyl)carbamoyl]propionyl]-N-methylamino]benzyloxy]-2-methylquinoline (103 mg) as an amorphous powder.

NMR (CDCl₃, δ) : 2.32 (1H, m), 2.48-2.69 (2H), 2.72 (3H, s), 2.82 (1H, m), 2.97 (3H, d, J=6Hz), 3.19 (3H, s), 5.64 (2H, s), 6.74 (1H, br s), 7.20-7.50 (8H), 7.57-7.67 (2H), 8.04 (1H, d, J=8Hz), 9.17 (1H, s)

15 Example 76

(1) 8-[3-(N-Acetoxyacetyl-N-methylamino)-2,6-dichlorobenzyloxy]-2-methylquinoline was obtained from 8-hydroxy-2-methylquinoline and 3-(N-acetoxyacetyl-N-methylamino)-2,6-dichlorobenzyl bromide according to a similar manner to that of Example 9.

mp : 104-105°C

NMR (CDCl₃, δ) : 2.22 (3H, s), 2.72 (3H, s), 3.20 (3H, s), 4.12 (1H, d, J=15Hz), 4.45 (1H, d, J=15Hz), 5.62 (1H, d, J=10Hz), 5.68 (1H, d, J=10Hz), 7.20-7.50 (6H, m), 8.02 (1H, d, J=8Hz)

(2) To a solution of 8-[3-(N-acetoxyacetyl-N-methylamino)-2,6-dichlorobenzyloxy]-2-methylquinoline (640 mg) in methanol (6.4 ml) was added potassium carbonate (395 mg), and the mixture was stirred for 2 hours at ambient temperature. To the mixture was added chloroform and water, the organic layer was washed with water and brine, dried over magnesium sulfate and concentrated in vacuo. The residue was purified by chromatography on silica gel (chloroform:ethyl acetate = 3:1, V/V) to give 8-[2,6-dichloro-3-(N-hydroxyacetyl-N-

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methylamino)benzyloxy]-2-methylquinoline (580 mg) as colorless amorphous.

5 NMR (CDCl₃, δ) : 2.74 (3H, s), 3.20-3.29 (4H, m), 3.62 (1H, dd, J=15, 4Hz), 3.80 (1H, dd, J=15, 5Hz), 5.62 (1H, d, J=10Hz), 5.69 (1H, d, J=10Hz), 7.20-7.50 (6H, m), 8.02 (1H, d, J=8Hz)

10 (3) To a solution of 8-[2,6-dichloro-3-(N-hydroxyacetyl-N-methylamino)benzyloxy]-2-methylquinoline (200 mg) and triethylamine (99.9 mg) in dry dichloromethane (2 ml) was added methanesulfonyl chloride (62.2 ml) under ice-cooling, and the mixture was stirred for 30 minutes. The mixture was washed with water, saturated sodium bicarbonate solution and brine, dried over magnesium sulfate and concentrated in vacuo
15 to give 8-[2,6-dichloro-3-(N-methanesulfonyloxyacetyl-N-methylamino)benzyloxy]-2-methylquinoline (220 mg) as colorless amorphous.

20 NMR (CDCl₃, δ) : 2.73 (3H, s), 3.22 (3H, s), 3.24 (3H, s), 4.30 (1H, d, J=15Hz), 4.50 (1H, d, J=15Hz), 5.63 (1H, d, J=10Hz), 5.69 (1H, d, J=10Hz), 7.21-7.53 (6H, m), 8.03 (1H, d, J=8Hz)

25 (4) To a mixture of dimethylamine hydrochloride (2.79 g) and triethylamine (6.92 g) in dichloromethane (50 ml) was added 4-bromobenzoyl chloride (5 g) was added slowly under ice-cooling, and the mixture was stirred for 20 minutes at the same temperature and for 2 hours at ambient temperature. The mixture was washed with water, saturated sodium bicarbonate solution and brine, dried over magnesium sulfate and
30 concentrated in vacuo to give 4-(dimethylcarbamoyl)-1-bromobenzene (5.20 g) as brown oil.

NMR (CDCl₃, δ) : 2.97 (3H, br s), 3.10 (3H, br s), 7.30 (2H, d, J=8Hz), 7.54 (2H, d, J=8Hz)

35 (5) To the mixture of 3-aminophenylboronic acid hemisulfate

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(4.88 g) in toluene (57 ml) were added tetrakis(triphenylphosphine)palladium(0) (659 mg), a solution of sodium carbonate (6.04 g) in water (28.5 ml), 4-(dimethylcarbamoyl)-1-bromobenzene (5.2 g) and methanol (14.3 ml) at ambient temperature, and the mixture was heated at 80°C. After 90 minutes, the cooled reaction mixture was extracted with chloroform and the organic layer was washed with aqueous sodium bicarbonate solution and brine. The organic layer was dried over magnesium sulfate and evaporated in vacuo. The residue was recrystallized from n-hexane-ethyl acetate to give 4-(3-aminophenyl)-N,N-dimethylbenzamide (4.7 g) as brown crystals.

mp : 139-141°C

NMR (CDCl₃, δ) : 3.04 (3H, br s), 3.13 (3H, br s), 3.75 (2H, br s), 6.69 (1H, d, J=8Hz), 6.89 (1H, s), 6.98 (1H, d, J=8Hz), 7.22 (1H, t, J=8Hz), 7.47 (2H, d, J=8Hz), 7.59 (2H, d, J=8Hz)

(6) A mixture of 8-[2,6-dichloro-3-(N-methanesulfonyloxyacetyl-N-methylamino)benzyloxy]-2-methylquinoline (110 mg), 4-(3-aminophenyl)-N,N-dimethylbenzamide (60.2 mg) and potassium carbonate (94.2 mg) in N,N-dimethylformamide (1 ml) was stirred for 12 hours at 60°C, and ethyl acetate and water were added thereto. The organic layer was washed with water and brine, dried over magnesium sulfate and concentrated in vacuo. The residue was purified by preparative thin-layer chromatography (chloroform:methanol = 20:1, V/V) to give 8-[2,6-dichloro-3-[N-[2-[4'-(dimethylcarbamoyl)biphenyl-3-ylamino]acetyl]-N-methylamino]benzyloxy]-2-methylquinoline (30 mg) as colorless amorphous.

NMR (CDCl₃, δ) : 2.70 (3H, s), 3.01 (3H, br s), 3.12 (3H, br s), 3.27 (3H, s), 3.51 (1H, br dd, J=17, 4Hz), 3.67 (1H, br dd, J=17, 5Hz), 4.81 (1H, br s), 5.66 (1H, d, J=10Hz), 5.71 (1H, d, J=10Hz), 6.49

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(1H, br dd, J=8, 3Hz), 6.70 (1H s), 6.91 (1H, br d, J=8Hz), 7.17-7.59 (11H, m), 8.02 (1H, d, J=8Hz)

Example 77

5 The following compounds were obtained according to a similar manner to that of Example 63.

- (1) 8-[2,6-Dichloro-3-[N-methyl-N-[3-[4-(methylcarbamoyl)-benzyloxy]benzoyl]amino]benzyloxy]-2-methylquinoline
10 NMR (CDCl₃, δ) : 2.70 (3H, s), 2.98 (3H, m), 3.33 (3H, s), 5.03 (2H, m), 5.60 (2H, m), 6.40 (1H, br), 6.80-8.10 (15H, m)
- (2) 8-[2,6-Dichloro-3-[N-methyl-N-[3-[4-(methylcarbamoyl)-phenoxymethyl]benzoyl]amino]benzyloxy]-2-methylquinoline
15 NMR (CDCl₃, δ) : 2.70 (3H, s), 2.90 (3H, m), 3.33 (3H, s), 5.00 (2H, m), 5.55 (2H, m), 6.15 (1H, br), 6.80-8.10 (15H, m)
- (3) 8-[2,6-Dichloro-3-[N-methyl-N-[3-[2-[4-(methylcarbamoyl)phenyl]ethyl]benzoyl]amino]benzyloxy]-2-methylquinoline
20 NMR (CDCl₃, δ) : 2.70 (3H, s), 2.80 (3H, br), 2.90 (3H, d, J=7Hz), 3.33 (3H, br), 5.60 (2H, d, J=8Hz), 6.20 (1H, br), 6.90-8.10 (15H, m)
- (4) 8-[2,6-Dichloro-3-[N-methyl-N-[6-[(E)-2-(4-methylcarbamoylphenyl)vinyl]pyridin-2-ylcarbonyl]-amino]benzyloxy]-2-methylquinoline
30 NMR (CDCl₃, δ) : 2.69 (3H, s), 3.02 (3H, d, J=6Hz), 3.45 (3H, s), 5.48 (1H, d, J=12Hz), 5.55 (1H, d, J=12Hz), 6.25 (1H, br s), 6.83 (1H, d, J=15Hz), 7.02 (1H, d, J=8Hz), 7.10-7.73 (14H), 7.98 (1H, d, J=8Hz)

35

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Example 78

(1) To a solution of 8-[2,6-dichloro-3-[N-methyl-N-(4-aminocinnamoylglycyl)amino]benzyloxy]-2-methylquinoline (50 mg) in ethanol (2 ml) were added N,N-bis(tert-butoxycarbonyl)-S-methoxyisothiurea (28 mg) and mercury(II) oxide (21 mg) at ambient temperature and stirred for 1 hours at 40°C. The reaction mixture was filtered and the filtrate was evaporated in vacuo. The residue was purified by preparative thin-layer chromatography (8% solution of methanol in chloroform) to give 8-[2,6-dichloro-3-[N-[4-[2,3-bis(tert-butoxycarbonyl)guanidino]-cinnamoylglycyl]-N-methylamino]benzyloxy]-2-methylquinoline (60 mg) as an amorphous powder.

NMR (CDCl₃, δ) : 1.50 (9H, s), 1.53 (9H, s), 2.73 (3H, s), 3.26 (3H, s), 3.64 (1H, dd, J=4, 18Hz), 3.94 (1H, dd, J=4, 18Hz), 5.60-5.71 (2H, m), 6.40 (1H, d, J=16Hz), 6.58 (1H, t-like), 7.21-7.35 (5H, m), 7.35-7.60 (6H, m), 7.64 (2H, d, J=8Hz), 8.03 (1H, d, J=8Hz)

(2) To a solution of 8-[2,6-dichloro-3-[N-[4-[2,3-bis(tert-butoxycarbonyl)guanidino]cinnamoylglycyl]-N-methylamino]benzyloxy]-2-methylquinoline (51 mg) in ethyl acetate and methanol was added 4N solution of hydrogen chloride in methanol (0.5 ml), and the mixture was stirred for 2 days at ambient temperature. The mixture was concentrated in vacuo, and the residue was dissolved in methanol. The solution was adjusted to pH 7 to 8 with aqueous ammonia and concentrated in vacuo. The residue was purified by preparative thin-layer chromatography (chloroform-methanol-aqueous ammonia) to give 8-[2,6-dichloro-3-[N-(4-guanidinocinnamoylglycyl)-N-methylamino]benzyloxy]-2-methylquinoline (12 mg) as amorphous powder.

NMR (CDCl₃-CD₃OD, δ) : 2.67 (3H, s), 3.21 (3H, s), 3.48 (1H, br d, J=16Hz), 3.71 (1H, br d, J=16Hz),

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5.50 (1H, d, J=10Hz), 5.65 (1H, d, J=10Hz), 6.26
(1H, d, J=16Hz), 6.97-7.12 (3H, m), 7.21-7.36 (4H,
m), 7.42-7.58 (3H, m), 7.80 (1H, d, J=8Hz), 8.08
(1H, d, J=8Hz)

5

Example 79

8-[2,6-Dimethyl-3-[N-methyl-N-[(E)-3-[6-(2-
oxopyrrolidin-1-yl)pyridin-3-yl]acryloylglycyl]amino]-
benzyloxy]-2-methylquinoline was obtained according to a
10 similar manner to that of Examples 58-(1) and (2).

NMR (CDCl₃, δ) : 2.13 (2H, quint, J=7.5Hz), 2.36 (3H,
s), 2.52 (3H, s), 2.68 (2H, t, J=7.5Hz), 2.72 (3H,
s), 3.25 (3H, s), 3.63 (1H, dd, J=4, 18Hz), 3.89
(1H, dd, J=4, 18Hz), 4.11 (2H, t, J=7.5Hz), 5.36
15 (2H, s), 6.47 (1H, d, J=16Hz), 6.70 (1H, t-like),
7.06 (1H, d, J=8Hz), 7.16 (1H, d, J=8Hz), 7.22-7.32
(2H, m), 7.38-7.48 (2H, m), 7.53 (1H, d, J=16Hz),
7.83 (1H, dd, J=2, 8Hz), 8.03 (1H, d, J=8Hz), 8.39-
8.46 (2H, m)

20

its dihydrochloride

NMR (DMSO-d₆, δ) : 2.04 (2H, quint, J=7.5Hz), 2.28
(3H, s), 2.48 (3H, s), 2.60 (2H, t, J=7.5Hz), 2.93
(3H, s), 3.11 (3H, s), 3.54 (1H, dd, J=4, 16Hz),
25 3.71 (1H, dd, J=4, 16Hz), 4.00 (2H, t, J=7.5Hz),
5.41-5.53 (2H, m), 6.83 (1H, d, J=16Hz), 7.28-7.41
(3H, m), 7.81-8.06 (5H, m), 8.25 (1H, t-like), 8.35
(1H, d, J=8Hz), 8.54 (1H, d, J=2Hz), 8.98 (1H, br
s)

30

Example 80

(1) 4-(Methoxycarbonyl)-N-methylcinnamamide was obtained
from 4-methoxycarbonylcinnamic acid and methylamine
hydrochloride according to a similar manner to that of
35 Preparation 2.

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mp : 180-182°C

NMR (DMSO-d₆, δ) : 2.71 (3H, d, J=4.0Hz), 3.87 (3H, s), 6.71 (1H, d, J=16.5Hz), 7.47 (1H, d, J=16.5Hz), 7.70 (2H, d, J=8.5Hz), 7.98 (2H, d, J=8.5Hz), 8.14 (1H, q, J=4.0Hz)

5

(2) 4-Carboxy-N-methylcinnamamide was obtained according to a similar manner to that of Preparation 3.

mp : 270-273°C

10

NMR (DMSO-d₆, δ) : 2.72 (3H, d, J=4.0Hz), 6.70 (1H, d, J=16.0Hz), 7.47 (1H, d, J=16.0Hz), 7.69 (2H, d, J=8.5Hz), 7.96 (2H, d, J=8.5Hz), 8.14 (1H, q, J=4.0Hz)

15

(3) 8-[2,6-Dichloro-3-[N-methyl-N-[4-[(E)-2-(methylcarbamoyl)vinyl]benzoylglycyl]amino]benzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Example 1.

mp : 143-150°C

20

NMR (DMSO-d₆, δ) : 2.61 (3H, s), 2.73 (3H, d, J=5.5Hz), 3.16 (3H, s), 3.57 (1H, dd, J=16.5, 5.5Hz), 3.85 (1H, dd, J=16.5, 5.5Hz), 5.50 (2H, s), 6.70 (1H, d, J=15.0Hz), 7.35-7.57 (5H, m), 7.67 (2H, d, J=8.5Hz), 7.79 (2H, s), 7.87 (2H, dd, J=8.5, 1.0Hz), 8.11 (1H, q, J=5.5Hz), 8.22 (1H, d, J=8.5Hz), 8.72 (1H, t, J=5.5Hz)

25

its hydrochloride

mp : 160-168°C

30

NMR (DMSO-d₆, δ) : 2.72 (3H, d, J=4.0Hz), 2.89 (3H, s), 3.16 (3H, s), 3.46-3.79 (1H, m), 3.93 (1H, dd, J=16.5, 5.5Hz), 5.59 (1H, d, J=10.5Hz), 5.65 (1H, d, J=10.5Hz), 6.70 (1H, d, J=16.0Hz), 7.45 (1H, d, J=16.0Hz), 7.64 (2H, d, J=8.5Hz), 7.77-7.97 (8H, m), 8.18 (1H, q, J=4.0Hz), 8.76 (1H, t, J=5.5Hz),

35

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8.94 (1H, m)

Example 81

5 8-[2,6-Dichloro-3-[N-[4-[(E)-2-(methoxycarbonyl)vinyl]-benzoylglycyl]-N-methylamino]benzyloxy]-2-methylquinoline was obtained from 8-[3-(N-glycyl-N-methylamino)-2,6-dichlorobenzyloxy]-2-methylquinoline and methyl

4-carboxycinnamate according to a similar manner to that of Example 1.

10 NMR (CDCl₃, δ) : 2.73 (3H, s), 3.27 (3H, s), 3.70 (1H, dd, J=16.5, 4.5Hz), 3.81 (3H, s), 4.00 (1H, dd, J=16.5, 4.5Hz), 5.63 (2H, s), 6.50 (1H, d, J=16.0Hz), 7.19 (1H, t, J=4.5Hz), 7.23-7.34 (3H, m), 7.37-7.51 (3H, m), 7.57 (2H, d, J=8.5Hz), 7.69 (1H, d, J=16.0Hz), 7.82 (2H, d, J=8.5Hz), 8.02 (1H, d, J=8.5Hz)

15

its hydrochloride

mp : 171-175°C

20 NMR (DMSO-d₆, δ) : 2.88 (3H, s), 3.17 (3H, s), 3.64 (1H, dd, J=16.5, 5.5Hz), 3.76 (3H, s), 3.92 (1H, dd, J=16.5, 5.5Hz), 5.59 (1H, d, J=11.5Hz), 5.66 (1H, d, J=11.5Hz), 6.76 (1H, d, J=16.0Hz), 7.71 (1H, d, J=16.0Hz), 7.78-7.97 (10H, m), 8.82 (1H, t, J=5.5Hz), 8.92 (1H, m)

25

Example 82

8-[3-[N-[(E)-3-[6-(Acetamido)pyridin-3-yl]acryloylglycyl]-N-methylamino]-2,6-dichlorobenzyloxy]-2-methyl-4-morpholinoquinoline was obtained from 8-hydroxy-2-methyl-4-morpholinoquinoline and 3-[N-[(E)-3-[6-(acetamido)pyridin-3-yl]acryloylglycyl]-N-methylamino]-2,6-dichlorobenzyl chloride according to a similar manner to that of Example 9.

30

35 NMR (CDCl₃, δ) : 2.21 (3H, s), 2.67 (3H, s), 3.15-

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3.23 (4H, m), 3.36 (3H, s), 3.70 (1H, dd, J=17, 4Hz), 3.88-4.01 (5H, m), 5.58 (1H, d, J=10Hz), 5.63 (1H, d, J=10Hz), 6.47 (1H, d, J=15Hz), 6.39-6.79 (2H, m), 7.19-7.28 (1H, overlapped with CDCl₃), 7.30 (1H, d, J=8Hz), 7.37 (1H, t, J=8Hz), 7.47 (1H, d, J=8Hz), 7.51 (1H, d, J=15Hz), 7.65 (1H, d, J=8Hz), 7.80 (1H, br d, J=8Hz), 8.09 (1H, br s), 8.19 (1H, br d, J=8Hz), 8.33 (1H, br s)

10 Example 83

(1) 8-[N-tert-Butoxycarbonyl-N-[2,6-dichloro-3-[N-methyl-N-[N'-(4-pyridyl)ureidoacetyl]amino]benzyl]amino]-2-methylquinoline was obtained by reacting 8-[N-[3-(N-glycyl-N-methylamino)-2,6-dichlorobenzyl]-N-tert-butoxycarbonylamino]-2-methylquinoline with phenyl 4-pyridylcarbamate according to a similar manner to that of Example 19.

15 NMR (CDCl₃, δ) : 1.21, 1.72 (9H, s), 2.72 (3H, s), 3.08, 3.12 (3H, s), 2.80, 3.26, 3.60-3.80 (2H, m), 5.03-5.18, 5.58-5.70 (2H, m), 6.20 (1H, m), 6.83, 20 6.95 (1H, m), 7.18 (4H, br), 7.36 (1H, m), 7.60 (1H, m), 7.90-8.05 (2H, m), 8.29 (2H, br)

(2) 8-[2,6-Dichloro-3-[N-methyl-N-[N'-(4-pyridyl)-ureidoacetyl]amino]benzylamino]-2-methylquinoline trihydrochloride was obtained according to a similar manner to that of Example 73-(4).

25 NMR (CDCl₃-CD₃OD, δ) : 2.85 (3H, s), 3.29 (3H, s), 3.40, 3.61-3.71, 3.84, 3.90 (2H, m), 4.86 (2H, m), 7.13 (1H, m), 7.28 (1H, m), 7.46-7.60 (5H, m), 7.97 30 (2H, m), 8.48 (2H, d, J=8Hz)

Example 84

(1) 8-[2,6-Dichloro-3-[(phthaloyl-DL-alanyl)amino]-benzyloxy]-2-methylquinoline was obtained from 8-(3-amino-2,6-dichlorobenzyloxy)-2-methylquinoline and 2-

- 240 -

phthalimidopropionyl chloride according to a similar manner to that of Preparation 9.

mp : 98-100°C (dec.)

5 NMR (CDCl₃, δ) : 1.75 (3H, d, J=6Hz), 2.72 (3H, s),
5.14 (1H, q, J=6Hz), 5.60 (2H, s), 7.20 (1H, d,
J=8Hz), 7.23-7.43 (4H), 7.76 (2H, dd, J=8, 2Hz),
7.89 (2H, dd, J=8, 2Hz), 8.00 (1H, d, J=8Hz),
8.32-8.39 (2H)

10 (2) 8-[2,6-Dichloro-3-[N-methyl-N-(phthaloyl-DL-alanyl)-
amino]benzyloxy]-2-methylquinoline was obtained
according to a similar manner to that of Preparation 10.

mp : 169-171°C

15 NMR (CDCl₃, δ) : 1.56 (0.9H, d, J=6Hz), 1.59 (2.1H,
d, J=6Hz), 2.70 (0.9H, s), 2.73 (2.1H, s), 3.21
(3H, s), 4.77-4.92 (1H), 5.00 (0.3H, d, J=10Hz),
5.28 (0.3H, d, J=10Hz), 5.64 (0.7H, d, J=10Hz),
5.70 (0.7H, d, J=10Hz), 7.00-8.06 (11H)

20 (3) 8-[3-(N-DL-Alanyl-N-methylamino)-2,6-dichlorobenzyloxy]-
2-methylquinoline was obtained according to a similar
manner to that of Preparation 11.

25 NMR (CDCl₃, δ) : 1.08-1.16 (3H), 2.73 (0.9H, s), 2.75
(2.1H, s), 3.14 (0.7H, q, J=6Hz), 3.21 (3H, s),
3.35 (0.3H, q, J=6Hz), 5.60-5.72 (0.6H), 5.66
(1.4H, s), 7.22-7.51 (6H), 8.03 (1H, d, J=8Hz)

30 (4) 8-[2,6-Dichloro-3-[N-methyl-N-[4-(methylcarbamoyl)-
cinnamoyl-DL-alanyl]amino]benzyloxy]-2-methylquinoline
was obtained according to a similar manner to that of
Example 1.

35 NMR (CDCl₃, δ) : 1.20 (1.8H, d, J=7Hz), 1.27 (1.2H, d,
J=7Hz), 2.70 (1.2H, s), 2.72 (1.8H, s), 2.95-3.03
(3H, m), 3.23 (3H, s), 4.43-4.51 (0.4H, m), 4.51-
4.63 (0.6H, m), 5.53-5.73 (2H, m), 6.17-6.30 (1H,

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m), 6.40-6.70 (2H, m), 7.18-7.35 (2H, m), 7.35-7.63 (7H, m), 7.63-7.80 (2H, m), 8.02 (1H, d, J=8Hz)

Example 85

5 (1) 8-[3-[(3-Bromopropionyl)amino]-2,6-dichlorobenzyloxy]-2-methylquinoline was obtained from 8-(3-amino-2,6-dichlorobenzyloxy)-2-methylquinoline and 3-bromopropionyl chloride according to a similar manner to that of Preparation 9.

10 NMR (CDCl₃, δ) : 2.70 (3H, s), 2.99 (0.4H, t, J=6Hz), 3.11 (1.6H, t, J=6Hz), 3.68 (1.6H, t, J=6Hz), 3.86 (0.4H, t, J=6Hz), 5.53 (2H, br s), 7.20-7.48 (6H), 8.00-8.09 (1H), 8.30-8.50 (1H)

15 (2) To a solution of 8-[3-[(3-bromopropionyl)amino]-2,6-dichlorobenzyloxy]-2-methylquinoline (2.08 g) in anhydrous dimethylformamide (21 ml) was added potassium phthalimide (905 mg) and the mixture was stirred at 100°C for 1.5 hours. To this reaction mixture were added ethyl acetate (105 ml) and water (105 ml) and the mixture was stirred for 1 hour under ice-water cooling. The precipitate was collected by filtration and washed with ethyl acetate and water to give 8-[2,6-dichloro-3-[(3-phthalimidopropionyl)amino]benzyloxy]-2-methylquinoline (1.49 g) as a grey powder.

25 NMR (CDCl₃, δ) : 2.70 (3H, s), 2.90 (2H, t, J=6Hz), 4.12 (2H, t, J=6Hz), 5.53 (2H, s), 7.18-7.45 (6H), 7.72 (2H, dd, J=8, 2Hz), 7.86 (2H, dd, J=8, 2Hz), 8.03 (1H, d, J=8Hz), 8.15-8.22 (1H)

30 (3) 8-[2,6-Dichloro-3-[N-methyl-N-(3-phthalimidopropionyl)-amino]benzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Preparation 10.
mp : 176-177°C

35 NMR (CDCl₃, δ) : 2.25-2.52 (2H), 2.70 (3H, s), 3.18 (3H, s), 3.86-4.04 (2H), 5.61 (2H, s), 7.20-7.46

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(6H), 7.68 (2H, dd, J=8, 2Hz), 7.80 (2H, dd, J=8, 2Hz), 8.00 (1H, d, J=8Hz)

5 (4) 8-[3-[N-(3-Aminopropionyl)-N-methylamino]-2,6-dichlorobenzyloxy]-2-methylquinoline was obtained according to a similar manner to that of Preparation 11.
NMR (CDCl₃, δ) : 1.96-2.21 (2H, m), 2.73 (3H, s),
2.81-2.98 (2H, m), 3.18 (3H, s), 5.64 (2H, s),
10 7.20-7.33 (3H, m), 7.33-7.50 (3H, m), 8.02 (1H, d, J=8Hz)

(5) 8-[2,6-Dichloro-3-[N-methyl-N-[3-[4-(methylcarbamoyl)-cinnamoylamino]propionyl]amino]benzyloxy]-2-methylquinoline was obtained according to a similar
15 manner to that of Example 1.
NMR (CDCl₃, δ) : 2.03-2.18 (1H, m), 2.18-2.33 (1H, m), 2.67 (3H, s), 2.98 (3H, d, J=6Hz), 3.17 (3H, s), 3.51-3.64 (2H, m), 5.62 (2H, s), 6.32-6.42 (1H, m), 6.42 (1H, d, J=15Hz), 6.73 (1H, t-like), 7.17-
20 7.31 (3H, m), 7.34-7.51 (5H, m), 7.55 (1H, d, J=15Hz), 7.73 (2H, d, J=8Hz), 8.01 (1H, d, J=8Hz)

(6) 8-[2,6-Dichloro-3-[N-[3-[N'-(3-(4-pyridylcarbamoyl)-phenyl]ureido]propionyl]-N-methylamino]benzyloxy]-2-methylquinoline was obtained according to a similar
25 manner to that of Example 19.
NMR (CDCl₃, δ) : 2.23-2.33 (1H, m), 2.33-2.45 (1H, m), 2.53 (3H, s), 3.10 (3H, s), 3.21-3.41 (1H, m), 3.41-3.57 (1H, m), 5.46 (1H, d, J=10Hz), 5.57 (1H, d, J=10Hz), 5.82 (1H, br peak), 7.03-7.17 (1H, m),
30 7.17-7.34 (4H, m), 7.43-7.52 (3H, m), 7.67 (2H, d, J=6Hz), 7.79 (1H, br s), 8.08 (1H, d, J=8Hz), 8.45 (2H, d, J=6Hz), 8.53 (1H, br s), 9.37 (1H, br s)

35 Example 86

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8-[3-[N-[N'-(3-Aminophenyl)ureidoacetyl]-N-methylamino]-2,6-dichlorobenzoyloxy]-4-dimethylamino-2-methylquinoline was obtained from 8-[2,6-dichloro-3-[N-methyl-[N-[N'-(3-nitrophenyl)ureidoacetyl]amino]benzoyloxy]-4-dimethylamino-2-methylquinoline according to a similar manner to that of Preparation 15.

NMR (CDCl₃, δ) : 2.48 (3H, s), 3.10 (6H, br peak), 3.20 (3H, s), 5.43 (1H, d, J=10Hz), 5.61 (1H, d, J=10Hz), 6.22 (1H, d, J=8Hz), 6.49 (1H, d, J=8Hz), 6.61 (1H, s-like), 6.75-6.88 (2H, m), 7.15-7.47 (7H, m), 7.63-7.71 (2H, m)

Example 87

8-[2,6-Dichloro-3-[N-[N'-(3-isonicotinamidophenyl)ureidoacetyl]-N-methylamino]benzoyloxy]-4-dimethylamino-2-methylquinoline was obtained from 8-[3-[N-[N'-(3-aminophenyl)ureidoacetyl]-N-methylamino]-2,6-dichlorobenzoyloxy]-4-dimethylamino-2-methylquinoline and isonicotinoyl chloride hydrochloride according to a similar manner to that of Example 52.

NMR (CDCl₃, δ) : 2.43 (3H, s), 3.03 (6H, s), 3.11 (3H, s), 3.74-4.08 (2H, m), 5.43 (1H, d, J=10Hz), 5.53 (1H, d, J=10Hz), 6.61 (1H, s), 6.89 (1H, br peak), 7.03 (1H, t-like), 7.08-7.33 (4H, m), 7.40 (1H, t, J=8Hz), 7.44-7.55 (1H, m), 7.55-7.88 (5H, m), 8.65 (2H, d, J=6Hz), 8.90 (1H, br s)

its trihydrochloride

NMR (DMSO₆, δ) : 2.65 (3H, s), 3.14 (3H, s), 3.41 (6H, s), 3.75 (1H, br d, J=18Hz), 5.56 (2H, s), 6.48 (1H, br s), 6.91 (1H, s), 7.18-7.25 (2H, m), 7.25-7.33 (1H, m), 7.58 (1H, t, J=8Hz), 7.75 (1H, d, J=8Hz), 7.81 (2H, s-like), 7.88 (1H, s-like), 7.93 (1H, d, J=8Hz), 8.03 (2H, d, J=6Hz), 8.88 (2H, d, J=6Hz), 9.08 (1H, s), 10.61 (1H, s)

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Example 88

8-[2,6-Dichloro-3-[N-methyl-N-[N'-(4-[N-(4-pyridyl)carbamoyl]phenyl)ureidoacetyl]amino]benzyloxy]-2-methylquinoline and its dihydrochloride was obtained from 8-[2,6-dichloro-3-[N-methyl-N-[N'-(4-carboxyphenyl)ureidoacetyl]amino]benzyloxy]-2-methylquinoline and 4-aminopyridine according to a similar manner to that of Example 7.

10 Example 89

8-[2,6-Dichloro-3-[N-methyl-N-[N'-(4-[N-(4-pyridylmethyl)carbamoyl]phenyl)ureidoacetyl]amino]benzyloxy]-2-methylquinoline was obtained from 8-[2,6-dichloro-3-[N-methyl-N-[N'-(4-carboxyphenyl)ureidoacetyl]amino]benzyloxy]-2-methylquinoline and 4-aminomethylpyridine according to a similar manner to that of Example 7.

20 NMR (CDCl₃, δ) : 2.56 (3H, s), 3.17 (3H, br), 3.49-3.82 (2H, m), 4.54 (2H, br), 5.47 (1H, d, J=8Hz), 5.57 (1H, m), 7.15 (2H, br), 7.23-7.33 (5H, m), 7.46 (2H, br), 7.60 (2H, d, J=8Hz), 8.08 (1H, m), 8.46 (2H, br), 8.93 (1H, br)

its dihydrochloride

25 NMR (CD₃OD, δ) : 3.00 (3H, s), 3.28 (3H, s), 3.80 (2H, m), 4.84 (2H, br), 5.70 (1H, d, J=8Hz), 5.84 (1H, d, J=8Hz), 7.49 (2H, d, J=8Hz), 7.73 (2H, d, J=4Hz), 7.84 (2H, m), 7.91 (4H, m), 8.04 (2H, d, J=8Hz), 8.78 (2H, d, J=8Hz), 9.03 (1H, m)

30 Example 90

(1) To a suspension of 2-amino-3-benzyloxypyridine (5.01 g) in polyphosphoric acid (40 ml) was dropwise added ethyl acetoacetate (6.51 g) at 60°C, and the mixture was warmed at 100°C for 3 hours. The mixture was poured into ice water, 35 neutralized with sodium hydroxide and extracted with

chloroform. The extract was washed with water, dried over magnesium sulfate and concentrated in vacuo. The residue was purified by flash chromatography (methanol-chloroform) to give 9-hydroxy-2-methyl-4H-pyrido[1,2-a]pyrimidin-4-one (880 mg).

mp : 146.3°C

NMR (CDCl₃, δ) : 2.46 (3H, s), 6.30 (1H, s), 7.00 (1H, t, J=8Hz), 7.13 (1H, d, J=8Hz), 8.51 (1H, d, J=8Hz)

10

(2) 9-[2,6-Dimethyl-3-[N-methyl-N-[4-(methylcarbamoyl)-cinnamoylglycyl]amino]benzyloxy]-2-methyl-4H-pyrido-[1,2-a]pyrimidin-4-one was obtained according to a similar manner to that of Example 9.

15

NMR (CDCl₃, δ) : 2.31 (3H, s), 2.45 (3H, s), 2.49 (3H, s), 3.00 (3H, d, J=5Hz), 3.25 (3H, s), 3.63 (1H, dd, J=17, 5Hz), 3.82 (1H, dd, J=17, 4Hz), 5.27 (2H, s), 6.23 (1H, br q, J=5Hz), 6.36 (1H, s), 6.51 (1H, d, J=15Hz), 6.73 (1H, br t, J=5Hz), 7.05 (1H, t, J=8Hz), 7.10 (1H, d, J=9Hz), 7.17 (1H, d, J=9Hz), 7.21 (1H, d, J=8Hz), 7.51 (2H, d, J=9Hz), 7.55 (1H, d, J=15Hz), 7.74 (2H, d, J=9Hz), 8.74 (1H, d, J=8Hz)

25

Throughout this specification and the claims which follow, unless the context requires otherwise, the word "comprise", and variations such as "comprises" and "comprising", will be understood to imply the inclusion of a stated integer or step or group of integers or steps but not the exclusion of any other integer or step or group of integers or steps.

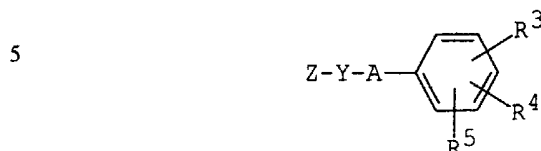
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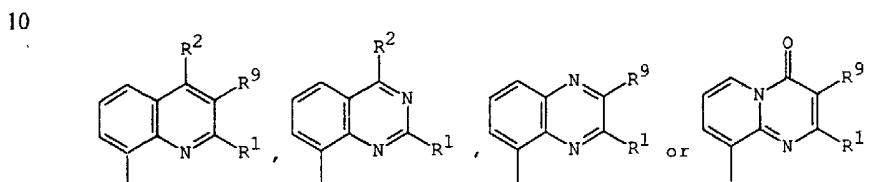
THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A compound of the formula:



wherein

Z is a group of the formula:



15

in which R¹ is lower alkyl,

R² is hydrogen; lower alkyl; halogen; aryl;
hydroxy(lower)alkyl; lower alkoxy(lower)alkyl;
carboxy; esterified carboxy; carbamoyl optionally
substituted with lower alkyl; cyclo(lower)alkoxy;
lower alkoxy optionally substituted with a substituent
selected from the group consisting of lower alkoxy,
lower alkylamino, hydroxy, carboxy, esterified

20



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carboxy and carbamoyl optionally substituted
with lower alkyl; halo(lower)alkoxy; lower
alkylamino optionally substituted with a
5 substituent selected from the group consisting
of lower alkoxy, lower alkylamino and
esterified carboxy; lower alkenylamino; or
an N-containing heterocyclic-N-yl group
optionally substituted with lower alkyl,

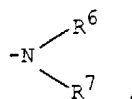
10 R^9 is hydrogen or lower alkyl,

R^3 is hydrogen, lower alkyl, lower alkoxy or
halogen,

R^4 is lower alkyl, lower alkoxy or halogen,

15 R^5 is hydroxy; nitro; lower alkoxy optionally
substituted with a substituent selected from the group
consisting of amino, acylamino and lower alkoxy;
piperazinyl substituted with acyl(lower)alkyl and oxo;
or a group of the formula :

20



in which R^6 is hydrogen or lower alkyl, and

25 R^7 is hydrogen; aryloxy-carbonyl; aroyl optionally
substituted with a substituent selected from
the group consisting of acyl-ar(lower)alkenyl,
acyl-ar(lower)alkoxy, acyl-aryloxy(lower)alkyl
and acyl-ar(lower)alkyl; heterocyclic-carbonyl
30 optionally substituted with acyl-
ar(lower)alkenyl; acyl(lower)alkanoyl;
hydroxy(lower)alkanoyl;
acyloxy(lower)alkanoyl;
carbamoyl optionally substituted with
35 acyl(lower)alkyl; or a group of the formula :

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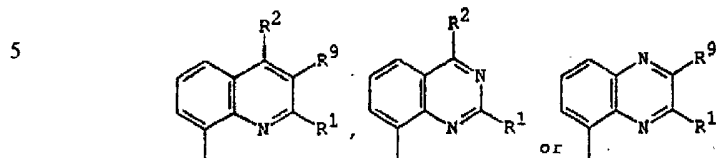
-(AA)-CO-Q-R⁸ or -(AA)-R¹⁰,

5 in which R⁸ is arylthio, aryloxy or arylamino, each of which
 is optionally substituted with substituent(s)
 selected from the group consisting of acyl,
 heterocyclic(lower)alkyl,
 heterocyclic(lower)alkenyl, nitro,
 amino and acylamino; heterocyclicthio or
 10 heterocyclicamino, each of which is optionally
 substituted with substituent(s) selected from
 the group consisting of acyl, acylamino, amino
 and lower alkoxy; halogen;
 tri(lower)alkylphosphonio; aryl substituted
 15 with substituent(s) selected from the group
 consisting of lower alkyl, lower alkoxy,
 acyl(lower)alkenyl,
 heterocyclic(lower)alkenyl, nitro, acyl,
 acyl(lower)alkoxy, guanidino, amino,
 20 acylamino, N-acyl-N-[heterocyclic(lower)-
 alkyl]amino and an N-containing heterocyclic-
 N-yl group substituted with oxo; or
 a heterocyclic group optionally substituted
 with substituent(s) selected from the group
 25 consisting of oxo, lower alkyl, lower alkoxy,
 nitro-aryl, acyl, acylamino, amino, N-acyl-N-
 (lower)alkylamino, lower alkylamino, halogen,
 heterocyclic(lower)alkyl,
 heterocyclic(lower)alkenyl and an N-containing
 heterocyclic-N-yl group substituted with oxo;
 30 R¹⁰ is hydrogen or acylbiphenyl,
 (AA) is amino acid residue, and
 Q is lower alkylene, lower alkenylene or single
 bond,
 A is lower alkylene, and
 35 Y is O or N-R¹¹, in which R¹¹ is hydrogen or an N-protective

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group,

provided that when Z is a group of the formula:



wherein R¹ is lower alkyl,

10 R² is hydrogen; lower alkyl; halogen; lower alkoxy optionally substituted with a substituent selected from the group consisting of lower alkoxy, lower alkylamino and hydroxy; or lower alkylamino, and R⁹ is hydrogen or lower alkyl,

15 then

- i) R³ is hydrogen, lower alkyl or lower alkoxy, and R⁴ is lower alkyl or lower alkoxy, or
- ii) R³ is hydrogen or halogen, R⁴ is halogen, and

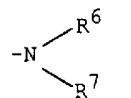
20 R⁵ is hydroxy; or lower alkoxy optionally substituted with a substituent selected from the group consisting of amino, acylamino and lower alkoxy;

and pharmaceutically acceptable salts thereof.

25

2. A compound of claim 1, wherein

30 R⁵ is a group of the formula:



in which R⁶ is hydrogen or lower alkyl, and R⁷ is hydrogen or a group of the formula:



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- (AA) -CO-Q-R⁸ or (AA) -R¹⁰.

3. A compound of claim 2, wherein
R⁸ is phenylthio, phenyloxy or phenylamino, each of which
5 is optionally substituted with substituent(s) selected
from the group consisting of lower alkoxycarbonyl, lower
alkylcarbamoyl, lower alkylsulfonylcarbamoyl,
tolylsulfonylcarbamoyl, pyridylcarbamoyl,
pyridyl(lower)alkylcarbamoyl, pyridyl(lower)alkyl,
10 pyridyl(lower)alkenyl, nitro, amino, lower alkanoylamino
and pyridylcarbonylamino; heterocyclicthio or
heterocyclicamino, each of which is optionally



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substituted with substituent(s) selected from the group consisting of carboxy, lower alkoxy, carbonyl, lower alkylcarbamoyl, lower alkanoylamino, amino and lower alkoxy; halogen;

5 tri(lower)alkylphosphonic; phenyl or naphthyl, each of which is substituted with substituent(s) selected from the group consisting of lower alkyl, lower alkoxy, nitro, carboxy, lower alkoxy, carbonyl, lower alkylcarbamoyl,

10 lower alkylamino(lower)alkylcarbamoyl, N-[lower alkylamino(lower)alkyl]-N-(lower alkyl)carbamoyl, pyridylcarbamoyl, pyridyl(lower)alkylcarbamoyl or its oxide, lower alkoxy, carbonyl(lower)alkenyl, lower alkylcarbamoyl(lower)alkenyl,

15 pyridyl(lower)alkenyl, carboxy(lower)alkoxy, lower alkoxy, carbonyl(lower)alkoxy, lower alkylcarbamoyl(lower)alkoxy, guanidino, amino, lower alkanoylamino, halo(lower)alkanolamino, lower alkylsulfonylamino, pyridylcarbonylamino,

20 lower alkylureido, N-[lower alkoxy(lower)alkanoyl]-N-[pyridyl(lower)alkyl]amino, 2-oxopyrrolidin-1-yl and 2-oxo-1,2-dihydropyridin-1-yl; or pyridyl, quinolyl, indolyl, tetrahydroquinolyl or piperazinyl, each of which is optionally

25 substituted with substituent(s) selected from the group consisting of oxo, lower alkyl, lower alkoxy, nitrophenyl, carboxy, lower alkoxy, carbonyl, lower alkanoyl, lower alkylcarbamoyl, pyridylcarbamoyl, pyrazinylcarbamoyl, isoquinolylcarbamoyl,

30 thiazolylcarbamoyl, lower alkylloxazolylcarbamoyl, lower alkylpyrazolylcarbamoyl, lower alkoxy, pyridylcarbamoyl, pyridyl(lower)alkylcarbamoyl, amino, lower alkanoylamino, pyridylcarbonylamino,

35 pyrazinylcarbonylamino,

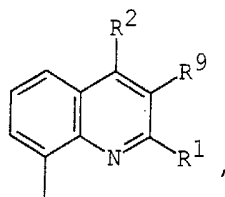
- 251 -

lower alkylpyridylcarbonylamino,
 lower alkoxy pyridylcarbonylamino,
 lower alkylthiopyridylcarbonylamino,
 pyridyl(lower)alkanoylamino,
 5 lower alkylpyridyl(lower)alkanoylamino,
 lower alkylsulfonylamino, lower alkylureido,
 N-(lower alkanoyl)-N-(lower)alkylamino,
 lower alkylamino, halogen, pyridyl(lower)alkyl,
 pyridyl(lower)alkenyl and 2-oxopyrrolidin-1-yl, and
 10 R^{10} is lower alkylcarbamoylebiphenyl.

4. A compound of claims 1, 2 or 3, wherein
 Z is a group of the formula :

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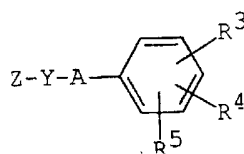
in which
 25 R^2 is aryl; hydroxy(lower)alkyl; lower alkoxy(lower)-
 alkyl; carboxy; esterified carboxy;
 carbamoyl optionally substituted with lower alkyl;
 cyclo(lower)alkoxy; lower alkoxy substituted with a
 substituent selected from the group consisting of
 30 carboxy, esterified carboxy and carbamoyl
 optionally substituted with lower alkyl;
 halo(lower)alkoxy; lower alkylamino substituted
 with a substituent selected from the group
 consisting of lower alkoxy, lower alkylamino and
 35 esterified carboxy; lower alkenylamino; or

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an N-containing heterocyclic group optionally substituted with lower alkyl.

5. A compound of claims 1, 2 or 3, wherein
5 R^3 is hydrogen, lower alkyl or lower alkoxy, and
 R^4 is lower alkyl or lower alkoxy.
6. A process for preparing a compound of the formula:

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wherein R^3 , R^4 , R^5 , A, Y and Z are each as defined in claim 1,
15 or its salt, which comprises

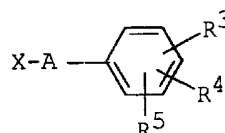
- a) reacting a compound of the formula:

20



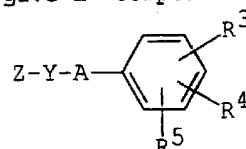
wherein Y and Z are each as defined in claim 1,
or its salt with a compound of the formula:

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wherein X is a leaving group, and
30 R^3 , R^4 , R^5 and A are each as defined in claim 1 or
its salt to give a compound of the formula:

35

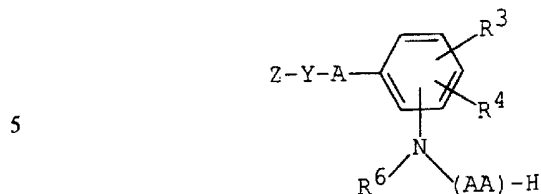


wherein R^3 , R^4 , R^5 , A, Y and Z are each as defined in claim
1,
or its salt, or

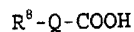


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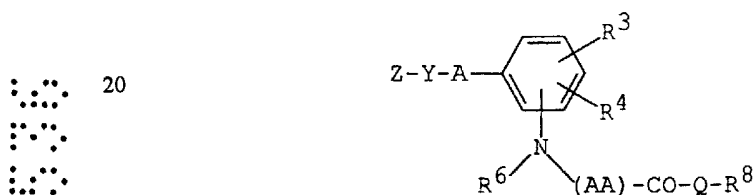
b) reacting a compound of the formula:



10 wherein R^3 , R^4 , R^6 , A, Y, Z and (AA) are each as defined in claim 1,
or its salt with a compound of the formula:

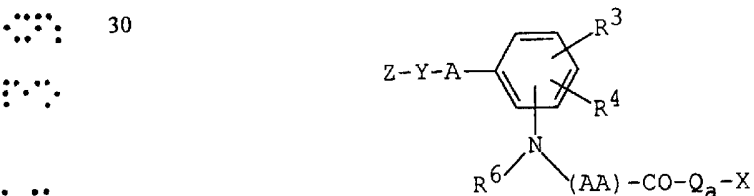


15 wherein R^8 and Q are each as defined in claim 1 or its reactive derivative at the carboxy group or a salt thereof to give a compound of the formula:



25 wherein R^3 , R^4 , R^6 , R^8 , A, Y, Z, (AA) and Q are each as defined in claim 1,
or its salt, or

30 c) reacting a compound of the formula:



wherein Q_a is lower alkylene, and



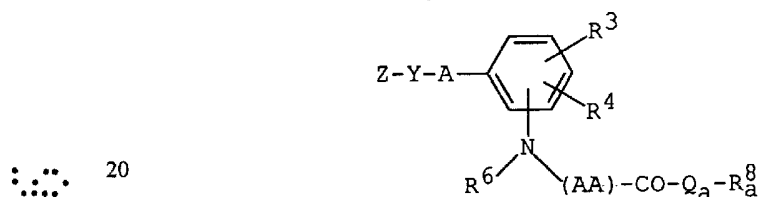
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R^3 , R^4 , R^6 , A, Y, Z, (AA) and X are each as defined in claim 1,
or its salt with a compound of the formula:



wherein R_a^8 is arylthio optionally substituted with substituent(s) selected from the group consisting of acyl, amino and acylamino; or
10 heterocyclicthio optionally substituted with substituent(s) selected from the group consisting of acyl, acylamino, amino and lower alkoxy;

15 or its salt to give a compound of the formula:



wherein R_a^8 and Q_a are each as defined above, and R^3 , R^4 , R^6 , A, Y, Z and (AA) are each as defined in claim 1
25 or its salt.

7. A pharmaceutical composition comprising a compound of claim 1, as an active ingredient, in association with a pharmaceutically acceptable, substantially nontoxic carrier or excipient.

8. A method for the prevention and/or the treatment of bradykinin or its analogues mediated diseases which comprises administering a compound of claim 1 to human being or animals.

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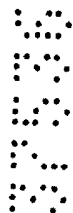
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9. Use of a compound of claim 1 for manufacture of a medicament for the prevention and/or the treatment of bradykinin or its analogues mediated diseases.
- 5 10. A compound of claim 1 substantially as hereinbefore described with reference to the examples.
11. A process of claim 6 substantially as hereinbefore
10 described with reference to the examples.

DATED this 11th day of March, 1999

15 **Fujisawa Pharmaceutical Co., Ltd.**

By DAVIES COLLISON CAVE
Patent Attorneys for the Applicant

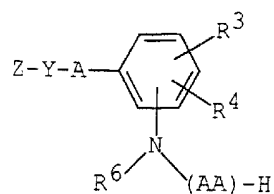


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or its salt, or

b) reacting a compound of the formula :

5

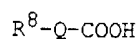


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wherein R^3 , R^4 , R^6 , A, Y, Z and (AA) are each as
defined above,

15

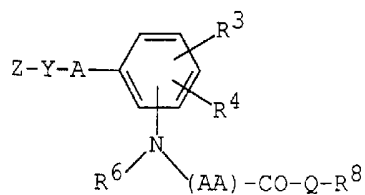
or its salt with a compound of the formula :



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wherein R^8 and Q are each as defined above,
or its reactive derivative at the carboxy group or a
salt thereof to give a compound of the formula :

25



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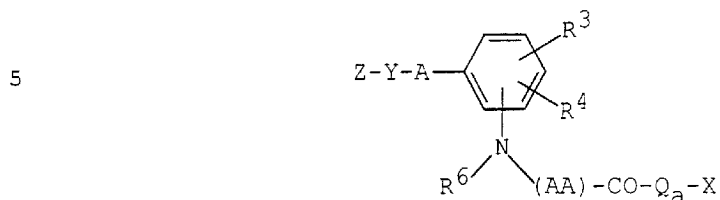
wherein R^3 , R^4 , R^6 , R^8 , A, Y, Z, (AA) and Q are
each as defined above,

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or its salt, or

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c) reacting a compound of the formula :

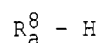


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wherein Q_a is lower alkylene, and
 R^3 , R^4 , R^6 , A, Y, Z, (AA) and X are each as
defined above,

15

or its salt with a compound of the formula :



20

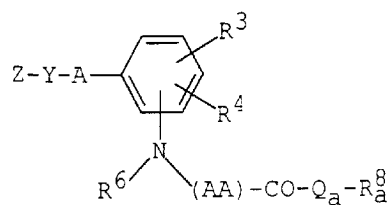
wherein R_a^8 is arylthio optionally substituted withsubstituent(s) selected from the group
consisting of acyl, amino and acylamino;or heterocyclicthio optionally substituted
with substituent(s) selected from the

25

group consisting of acyl, acylamino, amino
and lower alkoxy;

or its salt to give a compound of the formula :

30



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wherein R^3 , R^4 , R^6 , R_a^8 , A, Y, Z, (AA) and Q_a are each
as defined above,
or its salt.

- 5 7. A pharmaceutical composition comprising a compound of
claim 1, as an active ingredient, in association with a
pharmaceutically acceptable, substantially nontoxic
carrier or excipient.
- 10 8. A compound of claim 1 for use as a medicament.
9. A method for the prevention and/or the treatment of
bradykinin or its analogues mediated diseases which
comprises administering a compound of claim 1 to human
15 being or animals.
10. Use of a compound of claim 1 for manufacture of a
medicament for the prevention and/or the treatment of
bradykinin or its analogues mediated diseases.

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